protection areas. Information on aquifer characteristics can be obtained from the IDNR-GSB. These conceptual wellhead protection areas can be used to determine which site will be easiest to establish and manage. Depending upon the circumstances this may take some time, but the added security may be viewed as insurance that the well will be adequately protected and the money expended for the new well is spent wisely.

As new wells are constructed, hydrogeological information should be collected, including determinations of hydraulic conductivity. At a minimum, this will usually require a drawdown test or in some situations a pumping test. This will ensure that the wellhead protection area is based on the best available data.

All new public wells constructed in Iowa must conform to the state isolation distances in Chapter 43 of the Iowa Administrative Code [567] (Table 7). Site approval and drilling logs are to be submitted to the IDNR and a certified well driller must perform all well installations. All new public water supply wells are tested for compliance with drinking water standards before they are permitted to be put into production. In addition, many local authorities such as counties require approval of new well construction.

It is recommended that communities develop a wellhead protection plan for new wells. If a community already has an approved wellhead plan in effect, then the revised delineation map should be submitted with the permit application.

A proposed schedule is as follows:

1. Development of conceptual wellhead protection zones for consideration of new well placement. IDNR-GSB can provide technical assistance including maps of potential contaminants in these areas in order to aid decision-making.
2. Selection of new well site and application for public water supply permit to IDNR-EPD. This could include a copy of the delineation done by the local supplier.
3. Installation and testing of new well. Information on pumping test, well logs, expected pump rate, other collected data to be supplied to IDNR-EPD within 30 days after construction is complete.
4. IDNR-GSB will provide a delineation and initial contaminant inventory to the public water supplier within four weeks of the request being received.
5. It is recommended that a wellhead protection plan be submitted to IDNR-EPD for each new

community public water supply well within three years of placing the well in service. This plan will follow the procedures outlined in this document and may include upgrading the delineation and contaminant inventory supplied by the IDNR-GSB.

6. In order to maintain monitoring waivers already in place, it is suggested that a WHP be submitted by October 1, 2005.

CHAPTER 8

IDNR APPROVAL OF LOCAL WELLHEAD PROTECTION PLANS

Overview

- Approval of local wellhead plans is not required but is recommended.
- Monitoring waivers will not be granted to a public water supply system unless an approved wellhead plan is in place.
- Delineation can be submitted for review prior to completion of the full wellhead plan.
- The IDNR will supply technical assistance to public water supplies interested in developing a wellhead plan.
- Requirements for submission include:
  - A list of the members of the wellhead team.
  - A map of the delineated area.*
  - A map of potential contaminant sources.*
  - Details on the potential contaminant sources.*
  - A management plan for the wellhead area.
  - A contingency plan.
  - Methods for updating the plan.
  - Methods for community involvement.

*Provided to the PWS as part of the Source Water Assessment and Protection program.

Implementation and Plan Review

Participation in the Iowa Wellhead Protection program is voluntary and wellhead protection plans are not required for any public water supply well. It is, however, in the best interest of the public for wellhead protection plans to be developed, formally adopted, and implemented. Prevention of groundwater contamination is the ultimate benefit. However, there are decided economic benefits as well. The cost of protection versus the extremely high costs of remediation makes a wellhead protection plan attractive. A public water supply's capital costs and infrastructure investment are more protected if an approved wellhead protection plan is in place. The utility's relations with its customers and with the overall general public may also be improved.

Current Iowa law requires public water supplies to monitor regularly for a wide range of contaminants. This can be an expensive process. Monitoring waivers (including permanent monitoring relief for Synthetic Organic Contaminants (SOCs) by Analytical Series and Inorganic Contaminants under the IDNR's concurrent monitoring/waiver program) can be granted to those public water supplies that implement an approved Wellhead Protection Plan. Contact the IDNR-Water Supply Section for more details about the monitoring relief policy. Other potential benefits may include assuring the system's status as a "viable" water system under the existing IDNR definition. These are major financial incentives for development of a plan, and when considered along with the other advantages, the Wellhead Protection Plan becomes an attractive alternative for all public water supplies.

All plans and any revisions of the plan, including new delineations, will be reviewed by the IDNR. Development of a wellhead protection plan can be time-intensive. Several years may be required to complete the necessary steps. Approval of local wellhead protection plans will be based on the adequacy of the delineation and contaminant source inventory, as well as an assessment of the objectives and management strategies employed within the wellhead protection area to protect the groundwater source. Approval of delineation areas will be based on the geologic characteristics of the well and aquifer. Required submission elements are included later in this chapter.

Following IDNR approval of the wellhead protection area, the remainder of the wellhead protection plan can be completed. Each finalized plan must contain a wellhead protection area delineation, a contaminant source inventory, management techniques to be used, and contingency plans as described in this document. When the wellhead protection plan is complete and ready to implement, it should be submitted to IDNR again for final review. Failure to include all required sections of the Wellhead Protection Plan will result in rejection of the plan by the IDNR (until such time as a complete plan is resubmitted). No permanent monitoring waivers can be granted until a complete and approved Wellhead Protection Plan is in place. Review of the plan document will occur within 6 weeks after submittal.

The IDNR will assist public water suppliers who are developing wellhead protection plans for submittal. This can be done by contacting the Water Supply Section directly, contacting the GSB for hydrogeologic and data support, or asking the Field Office representative when he/she is visiting your system as part of the five-year sanitary survey.

Community public water supplies will receive priority for assistance in development and review of wellhead plans over non-community systems. A vulnerability ranking has been developed for each municipal system in Iowa based on susceptibility to contamination, sole source and sole well consider-

ations, confinement layer thickness, and population served. Non-transient, non-community systems will have priority before transient, non-community systems.

Requirements for Submission

The following outlines the requirements for submission of a wellhead protection plan.

Wellhead Protection Team

Submit the names and affiliations of members in the final program document.

Delineation of the Wellhead Protection Area

An initial delineation of wellhead protection areas, based on existing data, will be provided to each PWS as part of the Source Water Assessment and Protection program. A community may wish to refine its delineation by obtaining further hydrogeologic information. The resulting delineated boundaries of the wellhead protection area and the location of the public water supply wells should be plotted on a base map at a scale appropriate to the area. All hydrogeologic information (aquifer thickness, transmissivity, groundwater flow direction and gradient, etc.) used to determine the protection area should be included. Well information (formations, casing, etc.) should be included for each well. A typical well log form is shown in Table 17. This form should be filled out as completely as possible (although it is realized that all of this information might not be known for each well). It is unlikely that monitoring waivers will be granted unless a TOT method is used for delineation.

Contaminant Source Inventory

As part of the Source Water Assessment and Protection program, each PWS will be provided a contaminant source inventory developed from existing data sources. The contaminant source inventory will include a map showing locations of potential contamination sources and a table describing the sources and an estimate of the susceptibility of the water supply wells to the potential contamination sources.

Additional potential contamination sources may exist within the wellhead protection area; therefore the water supplier and community need to verify and identify potential contaminants and revise susceptibility assessment accordingly. Potential contaminant sources should be accurately located and labeled on the water system's base map. Each of the contaminant sources should be listed in tabular format and keyed to the map. At a minimum, the table should contain the site ID, facility name, and type of operation. Both the map and table should be submitted for review. If a ranking system for risk evaluation is used, final rankings should be submitted along with a description of the method used.

Table 17. Example of well record form.

WELL RECORD (One form per well)

Site identification

Public water supply name _____ PWSID No. _____

Well designation _____

Map site designation, if different from well designation _____

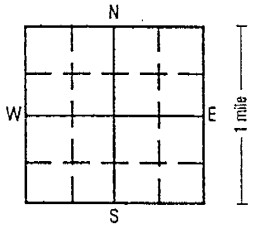
Location

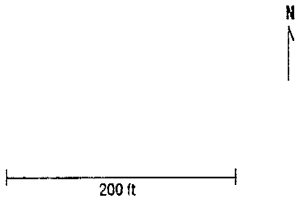
County _____

_____ mi. N/S and _____ mi. E/W of intersection of _____ and _____

_____ 1/4 of the _____ 1/4 of the _____ 1/4 of the _____ 1/4 of Sec _____ TWP _____ RNG _____ E/W *(circle one)*

Show exact location of well in section grid with a dot (●). Sketch map of well location on property.





☐ upland ☐ hillside ☐ valley Elevation (if known) _____

Well log *(attach additional copies as needed)*

From (ft.)	To (ft.)	Color	Materials description
0' — example	*10'*	*light brown*	*sand and gravel — example*
10'	*35'*	*tan*	*dolomite*

Remarks

Well status

☐ Active
☐ Standby
☐ Other _____
(explain)

Table 17. Continued.

Site identification

Public water supply name _____ PWSID No. _____

Well designation _____

Map site designation, if different from well designation _____

Hole size (diameter)

____ inch from __0__ ft to ____ ft

____ inch from ____ ft to ____ ft

hole size continued

____ inch from ____ ft to ____ ft

____ inch from ____ ft to ____ ft

Record all depth measurements from ground level (GL). Use (+) for above GL measurements.

Casing

Size (diameter)	Type / Wt	Depth top	Depth bottom	Amount (length)

Casing grouted? (yes / no) *(circle one)*

Grout type	Depth Top	Depth bottom	Amount (vol/wt)

Perforated or slotted casing? (yes / no)

Perforated / slotted from _____ ft to _____ ft

Perforated / slotted from _____ ft to _____ ft

Well screen? (yes / no)

Diameter (in)	Slot size	Depth Top	Depth Bottom	Length	Material
	0.___				
	0.___				

Bottom capped (yes / no) with _____

Seals / Packers (yes / no) kind _____ depth _____ ft

Gravel packed (yes / no) from _____ ft to _____ ft

type _____ amount _____

Pump installed? (yes / no)

Date ____ / ____ / ____

Installer's name _____

Type of pump _____ Depth to intake _____ ft

Pump diameter _____ Rated capacity _____ GPM

Typically operated at _____ GPM

Typically operated for _____ hours/day

Water information

Aquifer: (See Table 3-1)

Main water-supply zone from _____ ft to _____ ft ☐ seepage well

Static water level _____ ft below/above GL; ☐ tape ☐ airline ☐ E-line ☐ estimate

Pumping water level _____ ft below GL; ☐ tape ☐ airline ☐ E-line ☐ estimate

Measurements taken after _____ hours Date ____ / ____ / ____

Yield of _____ GPM;

Do you have this information?

(Keep the following information with your well records)

☐ Driller's log **(please submit a copy)**
☐ Pumping test **(please submit a copy)**
☐ GSB geologic strip log
☐ Geophysical log
☐ Raw water-quality analyses
☐ Other _____

_____ (explain)

Name _____ Position _____

Address _____

_____ Date ____ / ____ / ____

Management of the Wellhead Protection Area

A description of the proposed methods of management, the areas of concern that each method addresses, and how these will be implemented should be included. Education is recommended as a component of all plans. A brief synopsis of the proposed educational effort should be included with the submittal.

Contingency Plan

A water supply emergency contingency plan should be included in the final plan submittal. Chapter 6 outlines the contents of a plan.

Plan Review and Update

Updates and reviews of the wellhead protection and contingency plans should be performed as follows:

- Every 3 years: PWS reviews and updates wellhead protection plan and contingency plan
- Every 5 years: IDNR completes system sanitary survey for each PWS and concurrently reviews status of existing wellhead protection plan.
- Every 10 years IDNR will review and update the State Wellhead Protection Plan.

Table 18. *Time line for Wellhead Protection Plan updates*

	Year									
Plan Component	1	2	3	4	5	6	7	8	9	10
PWS WHP plan review and contingency plan update		●			●			●		
IDNR sanitary survey of PWS system				●					●	
IDNR review of PWS WHP plan status				●					●	
PWS update of WHP plan										●
IDNR review and update of state WHP plan									●	

Public Notification

Methods used for disseminating information on the wellhead protection plan to members of the community and to persons living or working in the wellhead protection area are to be included in the final plan document. A detailed description of all outreach activities is not necessary, but the types of media contacts and publicity which will be incorporated needs to be referenced.

REFERENCES

A number of documents have been published by various federal and state agencies to assist public water suppliers in implementing a Wellhead Protection Plan. Some of these publications are listed here categorized by subject. EPA publications can be obtained from U.S. Environmental Protection Agency, National Center for Environmental Publications and Information (NCEPI), P.O. Box 42419, Cincinnati, OH 45242, 1-800/490-9198, FAX (513) 489-8695, www.epa.gov/ncepihom/

General

Dean, L.F. and Wyckoff, M.A., 1991. Community Planning and Zoning for Groundwater Protection in Michigan: A Guidebook for Local Officials.

Des Moines Water Works, Howard R. Green Company, and The American Water Works Association, 1996. Wellhead Protection: A Model Plan for Iowa Water Suppliers. (available from Des Moines WaterWorks)

Forrest, C.W. and Olshansky, R., 1993. Groundwater Protection by Local Government. Illinois Department of Engineering and Natural Resources and Illinois Environmental Protection Agency.

Novo, F.D. and Jaffe, M., 1984. Local Groundwater Protection - Midwest Region. American Planning Assoc., Washington D.C.

U.S. EPA, 1997. Water on Tap: A Consumer's Guide to the Nation's Drinking Water. EPA 815-K-97-002.

U.S. EPA, 1995. Why do Wellhead Protection? EPA 813-K-95-001.

U.S. EPA, 1995. Benefits and Costs of Prevention: Case Studies of Community Wellhead Protection. EPA 813-B-95 005

U.S. EPA, 1995. Business Benefits of Wellhead Protection: Case Studies. EPA 813-B-95 004

U.S. EPA, 1994. Handbook: Ground Water and Wellhead Protection. EPA 625-R-94 001.

U.S. EPA, 1993. Seminar Publication: Wellhead Protection: A Guide for Small Communities. EPA 625-R-93 002.

U.S. EPA, 1992. Case Studies in Wellhead Protection: Ten Examples of Innovative Wellhead Protection Programs. 813-R-92-002

U.S. EPA, 1991. Protecting Local Groundwater Supplies Through Wellhead Protection. EPA 570-9-91-007.

U.S. EPA, 1990. Citizen's Guide to Ground-Water Protection. EPA 440-90-004.

U.S. EPA, 1989. Wellhead Protection Programs: Tools for Local Governments. EPA 440-6-89-002

U.S. EPA, 1988. Developing a State Wellhead Protection Program: A User's Guide to Assist State Agencies under the Safe Drinking Water Act. EPA 440-6-88-003.

U.S. EPA, 1985. Protection of Public Water Supplies from Ground-Water Contamination. EPA 625-4-85-016.

Wellhead Protection Area Delineation

Born, S.M., Yanggen, D.A., Czecholinski, A.R., Tierney, R.J., and Hennings, R.G., 1988. Wellhead Protection Districts in Wisconsin: An Analysis and Test Applications. Wisconsin Geological and Natural History Survey Special Report #10.

U.S. EPA, 1993. Case Studies in Wellhead Protection Area Delineation and Monitoring. EPA 600-R-93-107.

U.S. EPA, 1993. Guidelines for Delineation of Wellhead Protection Areas. EPA 440-5-93-001.

U.S. EPA, 1991. Wellhead Protection Strategies for Confined-Aquifer Settings. EPA 570 9-91-008.

U.S. EPA, 1991. Delineation of Wellhead Protection Areas in Fractured Rocks. EPA 570-9-91-009.

Risk Assessment

U.S. EPA, 1993. A Review of Methods for Assessing Aquifer Sensitivity and Ground Water Vulnerability to Pesticide Contamination. EPA 813-R-93-002.

Minnesota Department of Health, 1992. Tritium in Groundwater as a Tool to Estimate Well Vulnerability.

Contaminant Source Inventory

U.S. EPA, 1991. Guide for Conducting Contaminant Source Inventories for Public Drinking Water Supplies. EPA 570-9-91-014.

U.S. EPA, 1990. A Review of Sources of Ground-Water Contamination from Light Industry. EPA 440-6-90-005.

Management Techniques

Born, S.M., Yanggen, D.A., and Zaporozec, A., 1987. A Guide to Groundwater Planning and Management for Local Governments. Wisconsin Department of Natural Resources, Groundwater Management Plan Report #12.

Dean, L.F. and Wyckoff, M.A., 1991. Community Planning and Zoning for Groundwater Protection in Michigan: A Guidebook for Local Officials. Office of Water Resources, Michigan DNR.

Gordon, D.L., 1988. Guidelines for plugging abandoned water wells. Iowa Geological Survey Technical Information Series 15.

Kreitler, C.W. and Senger, R.K., 1991. Wellhead Protection Strategies for Confined-Aquifer Settings. EPA 570 9-91-008.

National Center for Small Communities, 1997. Action guide for Source Water Funding. NCSC, 444 N. Capitol St. NW, Washington, D.C. 20001.

Page, G.W., 1987. Planning for Groundwater Protection. Academic Press, Inc.

U.S. EPA, 1997. Catalog of Funding Sources for Watershed Protection. EPA841-B-97-008.

U.S. EPA, 1991. Managing Ground Water Contamination Sources in Wellhead Protection Areas: A Priority Setting Approach. EPA 570-9-91-023.

U.S. EPA, 1989. Local Financing for Wellhead Protection. EPA 440-6-89-001.

Yanggen, D.A. and Webendorfer, B., 1991. Groundwater Protection Through Local Land-use Controls. Wisconsin Geological and Natural History Survey Special Report #11.

Contingency Planning

Des Moines Water Works and The American Water Works Association, 1996. Emergency Preparedness: Preparing for the Unanticipated: A Model Plan for Iowa Water Suppliers. (available from Des Moines Water Works)

Iowa Association of Municipal Utilities, 1989. Water Conservation for Small Utilities, A Practical Guide to Local Water Conservation Planning.

U.S. EPA, 1990. Guide to Ground-Water Supply Contingency Planning for Local and State Governments: Technical Assistance Document. EPA 440-6-90-003.

Background Information on Iowa Geology

In addition to the reports listed below there are many publications on various aspects of Iowa Geology. Most of these publications are available from the IDNR-Geological Survey Bureau, 109 Trowbridge Hall, Iowa City, Iowa 52242-1319, 319-335-1575. Visit the survey's web site at www.igsb.uiowa.edu.

Water Atlases

The Geological Survey Bureau Water Atlases are prepared in cooperation with the U.S. Geological Survey. Each regional atlas covers several counties and contains a variety of water-resource information, including geologic and hydrologic aspects of surface-water and groundwater resources, water levels, well yields, water quality, water use and withdrawals, and water-resource laws and regulation. (by water atlas number)

Twenter, F.R. and Coble, R.W., 1965. The water story in central Iowa, Water Atlas 1, 89 p.

Coble, R.W. and Roberts, J.V., 1971. Water resources of southeast Iowa. Water Atlas 4, 101 p.
Cagle, J.W. and Heinitz, A.J., 1978. Water resources of south-central Iowa. Water Atlas 5, 97 p.
Wahl, K.D., Ludvigson, G.A., Ryan, G.L. and Steinkempf, W.C., 1978. Water resources of east-central Iowa. Water Atlas 6, 91 p.
Buchmiller, R., Gaillot, G., and Soenksen, P.J., 1985. Water resources of north-central Iowa. Water Atlas 7, 93 p.
Horick, P.J., 1989. Water resources of northeast Iowa. Water Atlas 8, 133 p.

For counties in the western one-third of Iowa, not covered by this series, refer to the following publications. (by date of publication)

Munter, J.A., Ludvigson, G.A., and Bunker, B.J., 1983. Hydrogeology and stratigraphy of the Dakota Formation in northwest Iowa. Iowa Geological Survey Water Supply Bulletin 13, 55 p.
Hunt, P.K.B., and Runkle, D.L., 1985. Ground-Water Data for the Alluvial, Buried Channel, Basal Pleistocene and Dakota Aquifer in West-Central, Iowa. USGS Open-File Report 84-819, 168 p.
Runkle, D.L., 1986. Hydrology of the Alluvial, Buried Channel, Basal Pleistocene and Dakota Aquifers in West-Central Iowa. USGS Open-File Report 85-4239, 111 p.
Hanson, R.E., Thompson, C.A.and VanDorpe, P.E., 1992. Availability and Quality of Water From the Alluvial, Glacial-Drift, and Dakota Aquifers and Water Use in Southwest Iowa. USGS Water-Resources Investigation Report 91-4156, 187 p.

Open-File County Groundwater Reports

The Open-File County Groundwater Resources Report series consists of summary reports on the groundwater resources of individual Iowa counties. Information includes the nature of groundwater occurrence in the county, water-bearing geologic units (surficial and bedrock aquifers), depths to various aquifers, yields of various aquifers, water quality information, recommendations for well construction, water treatment, well abandonment, sources of additional information, and a list of local well drillers and contractors. Not all counties are completed, contact GSB for further information.

Maps

The Miscellaneous Map series is composed of maps covering specific aspects of Iowa geology. Some maps in the series include explanatory texts.

Horick, P.J., and Steinhilber, W.L., 1973. Mississippian Aquifer of Iowa, 3 color sheets with text.

Horick, P.J., 1978. Jordan Aquifer of Iowa, 3 color sheets with text.

Horick, P.J., 1984. Silurian-Devonian Aquifer of Iowa, 4 color sheets with text.

Hoyer, B.E., and Hallberg, G.R., 1991. Groundwater Vulnerability Regions of Iowa, Geological Survey Bureau Special Map Series II.

Landforms

Prior, J.C., 1991. Landforms of Iowa, University of Iowa Press, Iowa City, Iowa, 154 p.

GLOSSARY

alluvium – strata that were deposited by water, commonly consisting of sand, gravel, and silts. These generally are permeable and make very good aquifers. Usually associated with present day streams.

aquifer – a geologic formation capable of yielding enough water to supply a well or spring.

artesian aquifer - see confined aquifer.

cone of depression - a depression in the water table or potentiometric surface, in the shape of an inverted cone, in response to groundwater withdrawal.

confined aquifer (or artesian aquifer) – an aquifer in which the groundwater is under pressure greater than atmospheric pressure; the static water level in a well in a confined aquifer rises to a level above the top of the aquifer.

contaminants – substances which may have an adverse health effect on individuals. In this context, contaminants are defined as those substances for which EPA or the State of Iowa has issued either a MCL (maximum contaminant level), a health advisory level, or occur on EPA's Hazardous Substances List or on the Hazardous Materials List.

drawdown – the difference between the level of water standing in a well under non-pumping and pumping conditions.

drift aquifers - glacial drift that contains assorted sizes of earth materials left by a glacier; these aquifers are often pockets of sand and gravel surrounded by clay-rich material; their size is irregular and location is random.

hydraulic conductivity – the rate of flow of water (amount delivered per cross-section area per unit time) that will move through soil or a saturated geologic formation; the rate is determined by the size and shape of the pore spaces in the rock material and their degree of interconnection.

hydraulic gradient – the slope of the water table or potentiometric surface; hydraulic gradient indicates which direction groundwater will flow and how rapidly.

Material Safety Data Sheets – Sheets are available for all hazardous chemicals and describe the physical properties of the substance and the physical and health hazards associated with that

substance. These forms are available from the product supplier and are required to be kept on site under the Emergency Planning and Community Right-to-Know Act (EPCRA – Title III of SARA).

nonpoint-source contamination - contamination originating from a diffuse source or sources; dispersed contamination such as runoff or percolation from agricultural or urban areas.

permeability – a measure of the connectedness of the pores in a formation. A permeable formation will allow water to travel freely under normal conditions; a low-permeability layer will retard the flow of water.

point-source contamination - contamination originating from a single, isolated source, such as a drainpipe or an underground storage tank.

porosity – the volume of open space in a geologic formation. It is expressed as the ratio of the volume of openings to the total volume and therefore is unitless.

recharge area – the area in which water replenishes the saturated zone from surface infiltration.

source water – the origin of drinking water for a particular regulated public water supply system for the purposes of human consumption. "Human consumption" means water used as part of or in connection with drinking; washing; food processing or incidental to commercial food preparation, such as: water used in beverages or other food items; ice used in drinks or in salad bars; water for washing of vegetables or other food items; water used for washing dishes; pans or utensils used in food preparation or service; water used for clean-up and washing of food preparation or service areas; water for bathing, showering, hand washing, or oral hygiene purposes. Human consumption does not include: water for production of packaged or bulk food products regulated by other state or federal regulatory agencies, such as livestock slaughtering or bottled or canned food and beverages; cooling water; industrial or commercial wash waters used for non-food products; irrigation water; water used in toilets or urinals.

specific capacity – the rate of discharge of water from a well per unit of drawdown in the well.

transmissivity – the capacity of an aquifer to transmit water to a well or spring.

unconfined aquifer - an aquifer in which the static water level does not rise above the top of the aquifer.

water table – the top of an unconfined aquifer representing the interface between the atmosphere and the saturated zone.

well log – a description of the formations and materials encountered when drilling a well.

APPENDIX A

MEMBERS OF THE WELLHEAD PROTECTION ADVISORY PANEL

These individuals represented the listed organizations during parts of the development of this plan. In some cases, they are no longer with the organizations listed.

Mr. Lyle Asell
U.S. Department of Agriculture
Natural Resources Conservation Service

Mr. Les Beck
County Zoning Association

Mr. Thomas Bredeweg
Iowa League of Cities

Mr. Robert Buchmiller
U.S. Geological Survey

Dr. Michael Burkart
Iowa Groundwater Association

Mr. Greg Caron
Iowa Rural Water Association

Mr. Jim Caldwell
Iowa Groundwater Association

Mr. Ken Choquette
Department of Public Health

Mr. Ted Corrigan
Des Moines Water Works

Mr. Norm Dudley
City of Scranton

Mr. Robert Dunlevy
U.S. EPA, Region VII

Mr. Chuck Eckermann
Iowa Dept. of Agriculture and Land Stewardship
Pesticide Bureau

Mr. Jim Ellerhoff
Iowa Dept. of Agriculture and Land Stewardship
Pesticide Bureau

Dr. Thomas Glanville
Iowa State Extension

Dr. George R. Hallberg
University of Iowa Hygienic Lab

Mr. Fenton Hanselman
City of New Sharon

Mr. John Haas
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Ms. Diana Hansen
Program Compliance, EPD
Iowa Department of Natural Resources

Mr. Scott Hemingway
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Dr. Mohammad Z. Iqbal
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Soil Conservation Division

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Natural Resources Conservation Service

Mr. Darrell McAllister,
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Iowa Farm Bureau

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Paul VanDorpe

APPENDIX B

COMMENTS FROM ADVISORY COMMITTEE MEETINGS

Introduction

The Geological Survey Bureau of the Iowa Department of Natural Resources (GSB-IDNR) is responsible for the development of the Iowa Wellhead Protection Plan. Following U.S. EPA recommendations, an advisory committee representing government and private entities from the across the state was established. The members of the committee and the organizations they represent are listed in Appendix A. The function of the committee was to discuss the topics to be included in the Wellhead Protection Plan, and present the views of the various organizations they represented as they pertained to those topics. The committee met quarterly throughout the development of the Iowa Wellhead Protection Plan. This appendix will briefly review some of the major topics covered during these meetings.

Voluntary Versus Mandatory Wellhead Protection Programs

It was generally agreed that the Iowa Wellhead Protection Plan would be a voluntary program. It was noted and agreed by most that mandatory programs are usually more effective, but the Iowa program is voluntary for several reasons. Reasons for a voluntary program include lack of legislative support and funding for a regulatory program.

Other State Wellhead Protection Plans

The committee looked at the Wellhead Protection Plans from other states to assess the degree of success that these states have achieved with various aspects of their plans. Most of these plans are too new to determine their success. Participation in most state programs has been spotty, but in general, participation has been better where there is more support by the state. It was strongly suggested that the Iowa DNR provide materials and personnel in support of the wellhead protection program.

It was noted that some states opted to include only the minimum requirements in their plans. The committee agreed that this is not the method that Iowa should use, and that an effort should be put forth to establish a plan that, while allowing for flexibility, does specify the requirements that would lead to a successful wellhead protection plan.

Waivers and Other Incentives

The committee generally agreed that monitoring waivers were a good incentive to offer for participation in the Wellhead Protection Plan Program. The extent of waivers and how to implement them were tougher questions and there was no consensus on these topics. Some committee members believed that the waivers should be tied to the Wellhead Protection Area delineation method employed. Others favored making waivers subject to approval of the entire Wellhead Protection Plan, regardless of the delineation method. It was agreed that over time, waivers can offset the cost of Wellhead Protection Plan development, as current monitoring requirements can be expensive.

Other potential incentives discussed included: the use of state revolving funds for wellhead plan implementation, property tax relief, block grants, and public opinion.

Wellhead Protection Area Delineation

Considerable time was spent discussing the delineation methods that should be employed when creating a Wellhead Protection Plan. The Wellhead Protection Plan Program is voluntary, but if monitoring waivers are tied to the area delineation, some control over the method used can be exercised. It was suggested and agreed by most committee members that one method should be recommended, but that the process should be conducted in steps.

The first step would be to establish a 2,500-foot fixed-radius circle around each well as a preliminary protection area. Some members noted that for certain aquifer types, this might be too large an area to require. It was suggested that municipalities be required to provide evidence that 2500 feet is excessive if they wished to reduce the area. The fixed circle is seen as a method of getting the Wellhead Protection Plan initiated, and while it is not an ideal situation, it does provide a certain amount of protection while a more precise delineation method is used to refine the Wellhead Protection Area.

The recommended second step is to employ a delineation method that uses time-of-travel (TOT) as criteria for the wellhead area. Considerable time was spent discussing the TOT methods. Specific issues that were discussed included: the emergency response time that might be required for municipalities to react to contamination; the inability of computer models to calculate wellhead areas for less than one year time of travel; aquifer types as they apply to time of travel; and the problems associated with calculation of time of travel, such as lack of data and expertise. It was

noted that during workshops conducted by the Des Moines Water Works, water suppliers have been generally receptive to a compromise that allows them to do some of the delineation on their own, but they need GSB assistance with well and aquifer data.

Concerns were raised that the data available to municipalities working on Wellhead Protection Plans might not be adequate to help them properly delineate Wellhead Protection Areas. GSB has most municipal wells in their database, totaling around 1900 public water supplies statewide. There are, however, several thousand public water supplies in Iowa. Although the Wellhead Protection Plan Program applies to all public water supplies, it was suggested that we apply the plan primarily to municipal wells, since the available data is better for these wells and would make the implementation more efficient.

Risk Assessment

The committee discussed the vulnerability issues that must be addressed by each water supplier developing a Wellhead Protection Plan. There are three categories of vulnerability that must be determined for each well: well vulnerability independent of contaminant sources or aquifer vulnerability; the vulnerability of the aquifer itself to contamination; and the toxicity of contaminant sources themselves. In many cases well vulnerability can be reduced by implementation of well rehabilitation measures. It was felt that most water suppliers also lack the expertise to do aquifer vulnerability studies, so this should be done by experts. However if aquifer vulnerability is tied to thickness of confining materials it is possible for water suppliers to determine degree of risk. There is nothing that can be done about aquifer vulnerability, but it is important that this factor be known. The main focus of the Wellhead Protection Plan for public water suppliers will be the location of potential contaminants, because this is the one vulnerability factor that can be controlled by the municipality.

Committee members agreed that methods for risk assessment and prioritization of contaminant sources needs to be easy to understand. It was felt that simplified tables, although understating the complexity of contaminant migration, would be more useful than tables tied to toxicity and mobility of contaminants.

Well Vulnerability

The first step in risk assessment should be determination of the well vulnerability. It should be determined if there is a pre-existing contamination problem, such as elevated nitrate levels or other

contaminants. How surface drainage affects the well should also be determined. Information on the well casing and characteristics should be noted where possible. It was also recommended that any history of bacterial contamination be determined.

Aquifer Vulnerability

Aquifer vulnerability should be determined next. Municipalities need to know what aquifer type they draw their drinking water from, as far as confined or unconfined, deep or shallow, thickness of confining layer, pathways to the aquifer, etc. In simplified fashion, this can be tied to the thickness of the overlying confining materials and when the geology is not known, well depth can be used as a surrogate.

Contaminant Source Inventory

Identification of all potential contaminants is perhaps the most important step in the wellhead protection process. It was suggested by the committee that the contaminant lists be as simple to use as possible. It was generally agreed that the inventory process should be completed in two steps. The first would involve a check off, listing locations of all potential contaminant sources within the wellhead area. Then for the second step priorities should be set via a ranking of contaminant locations based on contaminant type, location, and mobility. The final step would be to precisely identify the contaminants and their locations at each location. It is also recommended that all current pollution prevention plans be identified.

Management

The advisory committee discussed the issues related to management and the techniques that can best be used in Iowa. Main considerations discussed included: availability of resources; local support for management programs; legal authority of municipalities; and financial considerations such as taxes, fees, capital financing, and grants. It was generally agreed by the committee that non-regulatory management techniques are desirable when possible. A key to the success of the Wellhead Protection Plan is local cooperation. In most cases, this is more easily achieved through non-regulatory means. All committee members agreed that public education is an important component that should be included in the state Wellhead Protection Plan. Programs such as Farm*A*Syst and Home*A*Syst were discussed and endorsed. Other educational tools such as groundwater protection demonstrations, sign posting, AWWA short courses, the Des Moines Water Works video, public service notices and brochures, satellite up-link conferences, and DNR

training sessions were also identified as beneficial.

The committee discussed all of the management techniques recommended by the U.S. EPA, including regulatory methods such as zoning ordinances. They recognized that in some cases these regulatory methods would be necessary for the Wellhead Protection Plan to be successful, and in many cases regulatory methods would not significantly hurt public support of the plan. The committee recommended that all applicable methods, both regulatory and non-regulatory, be tailored by each municipality to create the comprehensive management plan best suited to their needs.

General Comments

It was strongly suggested that IDNR develop an outreach and education program on wellhead protection. Many committee members felt that few water suppliers would develop a wellhead protection plan unless adequate resources and reminders were provided.

It was generally agreed that IDNR should review local wellhead protection plans. This mechanism could be tied to plan incentives as well as ensuring that local plans are adequate to protect the wellhead area.

Comments and Responses from Draft Plan Review

The members of the Iowa Wellhead Protection Plan Advisory Committee met on Thursday, November 13, 1997 in Des Moines to discuss the initial draft of the Iowa Wellhead Protection Plan. Comments and recommendations pertaining to the draft were solicited from members of the committee. The committee examined each chapter of the draft, and the significant comments related to content for each chapter are presented below. The comments below are paraphrased and similar comments combined, but care has been taken to retain their meaning. Comments made at the meeting and written comments are included. Responses are italicized.

The timeline for completion of the Iowa Wellhead Protection Plan was discussed. There are several steps that must be completed before the plan is final, including review and approval by DNR, public hearings, and an EPA review. The final draft copy is tentatively scheduled for completion in late December. Target date for final document completion is next summer.

Overall

The plan seems user-unfriendly and communities might not be able to deal with such a long document.

The plan seems divided between a policy document and a how-to guide.

The document is intended to detail the policy of the State of Iowa for wellhead protection. At the same time we do want it to be used by communities. It is unlikely that public water supplies will undertake wellhead protection simply from reading this document. A variety of other documents and videos are available which can be used as an introduction to wellhead protection. The methods detailed in this document can then be used by communities. Other forms and methods may be considered acceptable.

In addition, a general overview of the plan was added to the beginning of the document and each chapter now has bulleted highlights.

Chapter 1

Potential growth should not be included so prominently in the first paragraph.

The plan is mostly voluntary, but regulation and land use controls are discussed. This might send conflicting messages. We need to clarify this and emphasize that the program is voluntary except for new wells.

Language has been added to clarify these concerns.

Chapter 2

When listing contact people, the specific addresses will change and be out-of-date. Perhaps we should put the office as the contact rather than specific people, to avoid out-of-date references.

This is a valid concern, but we felt that having a name to ask for is better than an office.

We need to provide more funding sources. Expand funding sources paragraph to state that

the DNR will provide a clearinghouse for inquiries into funding sources.

The DNR feels that this area would be better provided by municipal or regional government organizations. DNR will provide information on funding sources under its control.

We need to include sources of help and incentives earlier in the document.

This was done by using the overview and bulleted sections in the document.

There should be plans to produce a web site. We should also provide a means for communities to contact other communities that have gone through, or are currently going through, the wellhead protection plan process.

At the present time there are no funds under which materials like this can be developed and maintained. Other agencies and organizations (ISU Extension, Iowa Rural Water Association) may be able to offer assistance.

We don't know exactly how much money communities will save with the monitoring waivers, so we can't include that information in the plan, but we need to provide the incentives so that small towns will participate. Can small towns afford to do a Wellhead Protection Plan? There are also more zoning and easement problems with small towns. On the other hand, there is less industry in small towns, so the inventory task will be easier.

The main incentive for a wellhead protection program is protection of the water source. Communities will have to use management techniques that fit their individual circumstances.

Are there any examples of states that have had good success with wellhead protection?

Several states have good programs, but there are no statistics on participation. The plans have not been in place long enough in most cases. Web page addresses for select state wellhead plans are listed in Appendix G.

Chapter 3

There was some misunderstanding that the TOT values were to be decided upon by the

community.

It is determined by each community based on how much time they feel they need to react to contamination. Language was added to clarify this matter.

Why do we suggest 2-year TOT and 2,500 feet?

The 2-year TOT is what is recommended by biologists to prevent contamination by pathogens. It is based on virus survivability. We need to protect a 2-year zone from biological contamination.

Should we substitute "ground water professional" for the word "consultant"?

This topic was discussed, and while "consultant" is vague, "ground water professional" is defined in Chapter 134 of the Iowa Administrative Code [567] and in general refers to those individuals that work on underground storage tanks. We continue to use the word "consultant" in the plan.

The minimum delineation radius of 2,500 feet may not be adequate in karst areas. A larger radius is suggested.

The minimum radius in karst areas was increased to one mile. In addition, it was strongly recommended that more precise delineation methods be used to delineate the wellhead area in karst regions. Communities can contact IDNR-GSB for assistance.

Chapter 4

It is important to have the local fire department members involved in this process.

This is mentioned in the plan.

Historical locations are important (e.g., locations of old gas stations, etc.) We need to emphasize this in the plan.

Language was added for this.

Table 10 needs a category for abandoned wells. What value do we give them? It should be

dependent on aquifer type. If aquifer type is unknown, it should get a value of 5.

Abandoned wells in the same aquifer were added as a 5.
What about high density livestock operations? What number defines high density?

This was changed to confined animal feeding operations.

Chapter 5

We need to emphasize that we are not prohibiting activities, but that we are trying to minimize the risk posed by certain activities.

This was emphasized in the bulleted chapter overview.

Conservation easements should be mentioned when we talk about the purchase option.

This was added.

Chapter 6

There were no comments.

Chapter 7

We need to ensure that communities have the help and resources available to them to comply with these regulations.

IDNR will provide technical assistance for implementation of wellhead protection.

Rather than a requirement, should we tie new wells into state funds? This would help us avoid the outcry about unfunded mandates.

State revolving fund loan money may be available for some of this.

Are replacement wells considered to be new wells?

Yes. Replacement wells, additional wells in an existing well field, etc,. all qualify as new

wells. These regulations therefore apply.
Housing developments pose a problem. These restrictions could prevent development in many cases. Are these requirements unworkable? This subject needs to be addressed.

The requirements were reworded such that they apply only to community systems. This does include housing developments.

The requirements were reworded so that only a delineation was required prior to constructing a well. IDNR-GSB will provide technical assistance in developing delineations and contaminant inventories for new wells.

In addition, once the well is constructed IDNR-GSB will provide a delineation and initial contaminant inventory for that well. The final wellhead plan will not be required upfront, but is to be submitted within three years of well completion.

Chapter 8

There were no comments.

APPENDIX C

RESPONSIVENESS SUMMARY – Public Hearings and Written Comments

The following information constitutes a summary of comments received in response to public hearings and public dissemination of the draft Iowa Wellhead Protection Plan (April, 1998). The Safe Drinking Water Act Amendments of 1996 authorize the Department to set up a voluntary program designed to help public water supplies prevent contamination of their water supply through identification and management of a wellhead protection zone. The proposed Iowa Wellhead Protection Plan was presented to the Environmental Protection Commission in draft form at the April 20, 1998 meeting.

The Environmental Protection Commission approved three public hearings on the draft wellhead plan. The plan provides water suppliers with needed information to develop wellhead protection, giving advice in defining surface and subsurface areas which contribute water to the suppliers' wells. The document identifies potential sources of contamination, gives a suggested step-by-step approach toward developing a local plan, and proposes useful elements of a contingency emergency plan in case of loss of a source due to contamination or catastrophic failure.
This plan was prepared by the Department's Geological Survey Bureau, with assistance from EPD Water Quality Bureau staff. Development of the plan was accomplished through the assistance of a thirty-four person Wellhead Protection Advisory Panel (members are identified in the draft plan). Panel members consisted of representatives from interested federal agencies, state agencies, universities, large and small public water supplies, environmental groups, and technical organizations with expertise in hydrogeology. Using information gathered from this technical advisory group which met seven times in 1997, the Department intends to pursue a plan utilizing either a calculated fixed radius or an arbitrary fixed radius (2,500 feet) for the majority of supplies. More integrated and hydrogeologically-based evaluations would be acceptable to the Department, but these are not required of individual water supplies.

Three public hearings were conducted to get final public response to the draft plan. They were scheduled and held as follows:

June 30 9:30-12:00 Trowbridge Hall Conference Room, University of Iowa, Iowa City
July 1 9:00-11:30 4th Floor Conference Room, Henry Wallace Building, 502 E. 9th Street, Des Moines
July 2 10:00-12:00 Le Mars Public Library, 46 1st Street SW, Le Mars

Following the three hearings, the plan will be submitted to the Commission for final approval, and subsequently disseminated to Iowa's public water supplies.

The draft plan was sent to interested and eligible active public water supply owners. This mailing was sent approximately eight days prior to the first public hearing on the proposed rules to give interested parties time to prepare comments. Notices of the public hearings were published in the Iowa Association of Municipal Utilities, Iowa Section American Water Works Association, and the Iowa Rural Water Association newsletters. Written comments to the proposed wellhead protection plan were accepted through Friday, July 10, 1998.

Oral comments from 2 individuals and written comments from 6 individuals or groups were received during the public comment period. In addition, 8 people participated in the public hearings without making specific comments. Participants' questions were answered prior to and after each public hearing. Written and oral comments addressed 11 subjects; these issues were also extensively discussed in the question and answer sessions. This responsiveness summary addresses all written and oral comments. Each comment is followed by the name of the commentator, a discussion of the issue raised, and IDNR staff recommendation.

1. Comment: **Safe drinking water is critical as both a local and a statewide health issue**. This protection plan is high in quality and represents a step forward for drinking water protection in Iowa.

Commentators: L.D. McMullen, P.E., Ph.D., CEO/General Manager, Des Moines Water Works; John Bilstein, Atlantic Municipal Utilities, Atlantic; Leon Lamer, CEO/General Manager, Marshalltown Water Works; Jennifer Hemingway, Iowa Rural Water Association; Karen Nachtman, Water Services Coordinator, Iowa Association of Municipal Utilities; David Wantland, Regulatory Specialist, Growmark, Inc.

Discussion: None necessary.

Recommended Action: No changes are recommended.

2. **Comment:** **IDNR needs to coordinate within its several areas of responsibility to ensure that public water supplies receive prior notification of changes to the kind of activities in the designated wellhead protection area, or new permitted activities within a wellhead area.** The language found on page 50 of the plan needs to specifically emphasize **prior coordination** so as to **preclude hazardous activities within a designated wellhead protection area being approved** before the city in question has time to comment/object. This will alleviate the burden on the individual water systems to follow-up on the current status of permits in each of IDNR's myriad program areas.

Commentators: John Bilstein, Atlantic Municipal Utilities, Atlantic; Leon Lamer, CEO/ General Manager, Marshalltown Water Works; Jennifer Hemingway, Iowa Rural Water Association; Karen Nachtman, Water Services Coordinator, Iowa Association of Municipal Utilities; David Wantland, Regulatory Specialist, Growmark, Inc.

Discussion: The suggested change simplifies the plan's intent and should consequently be adopted. The language on page 50 should be clarified to indicate that the Department will be responsible for prior coordination of changes to the wellhead protection area (where possible).

Recommended Action: Change the sentence on page 50 which currently reads, "IDNR will notify public water supplies of new permitted activities within the wellhead protection area" to read as follows: "IDNR will notify in advance public water supplies of new permitted activities within the wellhead protection area."

3. **Comment:** **On page 75, the draft plan states that in order to maintain monitoring waivers already in place, it is suggested that a WHP be submitted immediately."** Drinking water operation permit monitoring waivers save systems a considerable amount of money, and make a great deal of sense if systems are not susceptible to particular contaminants. Wellhead protection plans are a good

idea, but should **NOT** be a precondition for water systems receiving monitoring waivers. We disagree with the revocation of monitoring waivers for systems not having an approved wellhead protection plan. Particularly, permanent monitoring relief for Synthetic Organic Chemicals (SOCs) by Analytical Series and Inorganic Contaminants (generally) should not be placed in jeopardy by the lack of Department-reviewed and approved local wellhead protection plans. If this requirement is left in the plan, a specific timeline should be given in the final plan as to the date in which a system **must complete an approved WHP** (so as to keep their current operation permit monitoring waivers).

Commentators

John Bilstein, Atlantic Municipal Utilities, Atlantic; Leon Lamer, CEO/General Manager, Marshalltown Water Works; Jennifer Hemingway, Iowa Rural Water Association; Karen Nachtman, Water Services Coordinator, Iowa Association of Municipal Utilities; Harold Schiebout, City Manager, 335 First Avenue NW, Sioux Center, IA 51250.

Discussion:

IDNR has proposed this plan to help local water systems set up mechanisms for protecting their water sources. The plan is voluntary; systems do not HAVE to pursue wellhead protection. The language in question suggests systems submit wellhead protection plans. Interim monitoring relief is found at Section 1418 of the Safe Drinking Water Act Amendments of 1996. A State may modify the monitoring requirements for any regulated or unregulated contaminants for which monitoring isrequired other than microbial contaminants (or indicators thereof), disinfectants and disinfection byproducts (or corrosion byproducts) for an interim period to provide that any public water system serving 10,000 persons or fewer are not be required to conduct additional quarterly monitoring if— Monitoring fails to detect the presence of the contaminant in the ground or surface water supplying the water system; and if the State, considering the hydrogeology of the area and other relevant factors, determines the contaminant is unlikely to be detected by further monitoring. The interim relief period terminates at the end of 36

months after the date of enactment of the SDWA Amendments of 1996, e.g. it expires 8-6-99. Permanent monitoring relief (found at the same SDWA section) is available only to States having an approved source water assessment program, in accordance with guidance published by EPA. Tailored monitoring plans for water systems are accepted (as an alternate to monitoring requirements set forth in primary drinking water regulations — if IDNR concludes (based on data available at the time of adoption concerning **susceptibility, use, occurrence, or wellhead protection,** or from a **drinking water source water assessment** program) alternative monitoring would assure comparable protection. Alternative monitoring doesn't apply to regulated microbiological contaminants, disinfectants, or corrosion byproducts. Alternate monitoring provides one of the **clear potential benefits for systems to conduct source water contaminant assessments.** States that do not have an EPA-approved wellhead protection program (and source water assessment program) are NOT eligible to offer alternative monitoring to PWS's. By extension, systems which do not pursue wellhead and source protection are likely to be deemed not eligible for alternative (reduced) monitoring. (This decision is not yet confirmed).The comments address the wisdom of revocation of monitoring waivers, but this retraction is specifically tied by SDWA (and EPA) to source protection. Thus, the protection of interim monitoring relief (and by extension, permanent monitoring relief) is beyond the scope of this draft State wellhead plan, and the language suggesting submission of such plans needs to stay unchanged. However, IDNR recommends a longer phase-in for tying wellhead protection to permanent reduced monitoring than is implied by the plan as currently written, given present uncertainties regarding Federal direction concerning permanent monitoring relief, and the unquestioned benefits interim reduced monitoring has provided Iowa water systems. The date that systems should have a plan completed is recommended to be **October 1, 2005**. This specific date should allow sufficient time for systems to plan for these law and guidance changes related to contaminant monitoring and wellhead protection. New wells or wellfields are a separate issue; these, however, are unlikely to qualify

for interim or permanent monitoring relief until they have in effect proved themselves free of contamination.

Recommended Action: One change is recommended. At page 75, point #6, the wording should be changed from "In order to maintain monitoring waivers already in place, it is suggested that a WHP be submitted immediately" to "In order to maintain monitoring waivers already in place, it is suggested that a WHP be submitted ~~immediately~~ by October 1, 2005."

4. Comment: **The proposed plan uses a calculated fixed radius to delineate a wellhead protection plan. The plan does state that an arbitrary fixed radius (1/2 mile) is satisfactory to start with while the calculated fixed radius is being designed. If the delineation step is simple and straightforward, systems are more likely to follow through and complete source inventories and develop contingency plans.** We are concerned that the complexity of calculating a fixed radius will discourage some (smaller) systems from completing all of the steps necessary for adequate wellhead protection.

Commentators: L.D. McMullen, P.E., Ph.D., CEO/General Manager, Des Moines Water Works.

Discussion: This is a concern. However, the Department's interpretation of the Federal SDWA Section 1428 and EPA's Wellhead Protection Guidance is that the calculated fixed radius approach is most appropriate so as to alleviate such "potential" lack of follow-up on the part of water systems, due to the increased understanding of local hydrogeology the calculated fixed radius will create. Arbitrary fixed radius areas are allowed if local system feel they are more appropriate.

Recommended Action: No changes are recommended.

5. Comment

The Department should develop a more formalized training and public educational program on the benefits of conducting a wellhead protection program, and needs to set up an ongoing emphasis on technical assistance for utilities. Aid to utilities in conducting contaminant source inventories would be especially useful.

Commentators

L.D. McMullen, P.E., Ph.D., CEO/General Manager, Des Moines Water Works; Leon Lamer, CEO/General Manager, Marshalltown Water Works.

Discussion:

IDNR is proposing a statewide source water protection program for drinking water systems. This program helps water supplies forestall pollution and protect their resources at the local level. The program enables supplies to prevent source contamination through long term planning, minimizing hazard locations, and eliminating existing hazards. This plan fulfills the requirements of the SDWA Amendments of 1996 (P.L. 104-182) for source water delineation and assessment (Section 1453). There are currently about 1,911 permitted public water supplies (796 municipal, 366 other community, 615 Transient Noncommunity (TNC), and 134 Nontransient noncommunity (NTNC)) in Iowa with 1 or more wells and/or surface water intakes. (There are 34 active surface water systems within Iowa). Iowa's municipal supplies (about 860) are most critical, and consequently will be assessed and delineated first. Source inventories will be part of this assessment. IDNR will work with the technical advisory committee that was convened for development of the State's wellhead protection plan to work out technical matters pertaining to definition of critical areas for surface watersheds, as well as appropriate methods for evaluating time-of-travel for surface and combined surface water/groundwater systems. IDNR will also convene a separate Citizen's Advisory Panel and invite appropriate stakeholders groups to participate. Approximately 10 informational hearings will be held across Iowa regarding the source water plan. The technical advisory committee convened to

discuss implementation of SDWA and utilization of the State Revolving Fund (SRF) will also be kept abreast of IDNR's source water delineation and assessment. The final product for each supply will be delivered to the system operator. Product will consist of a base map showing roads, rivers, townships, railroads, and surface topography on which are plotted the delineated source area, watershed area, or combined surface/groundwater area. A 2nd map will show potential contaminant sources and their likely pathways to the water source. The contaminant data will be supplied on a map and summarized in table form. A short report will be prepared for each community detailing how the information was developed. The water supply is responsible for making the information available to the local community. In addition, copies will be placed in the files maintained by IDNR under the SDWA for each public supply. Many of the databases in the form of GIS coverages can be downloaded via Internet access and transparent file transfer protocol (FTP). It is IDNR's intent to maximize the presence of assessment maps on the Internet. This will facilitate use by the public, and help further the goal of public and utility/system education.

Recommended Action: No changes are recommended.

6. Comment **We support the concept of developing multi-jurisdictional memorandums of understanding. Joint efforts between jurisdictions will encourage utility participation.**

Commentators L.D. McMullen, P.E., Ph.D., CEO/General Manager, Des Moines Water Works; Leon Lamer, CEO/General Manager, Marshalltown Water Works.

Discussion: The suggested change is qualitative in nature; the Department feels multi-jurisdictional MOU's are a useful concept for inter-system cooperation and are thereby encouraged. However, since wellhead protection is voluntary, no specific changes to the plan need be incorporated within the document.

Recommended Action: No changes are recommended.

7. Comment **We support the recommendations in Chapter 7 for new wells.**

Commentators L.D. McMullen, P.E., Ph.D., CEO/General Manager, Des Moines Water Works.

Discussion: None needed.

Recommended Action: No changes are recommended.

8. Comment The arbitrary fixed radius (2,500 feet) represents about 400 acres of farmland. Some of this radius may intersect the radius of another well within a system's wellfield. **The system and the department should have the latitude to adjust the wellhead protection area based upon site geometry and other mitigating factors.**

Commentators: Leon Lamer, CEO/General Manager, Marshalltown Water Works; David Wantland, Regulatory Specialist, Growmark, Inc.

Discussion: The commentators are correct. However, since the wellhead protection planning process is a voluntary effort, adjusted arbitrary fixed radius areas are allowed if local system feel they are more appropriate.

Recommended Action: No changes are recommended.

9. Comment: **There are too many new acronyms in the proposal. All new names should be written out in full.**

Commentators: Leon Lamer, CEO/General Manager, Marshalltown Water Works.

Discussion: Acronyms are inserted for reasons of brevity; a list of acronyms and

glossary is provided on page 89 of the draft plan, and at appropriate places within the test of the document.

Recommended Action: No changes are recommended.

10. Comment: **Any requirements for additional protective activities should be based on a risk/benefit analysis; outside (governmental) funding may be necessary to mitigate the expense involved.**

Commentators: David Wantland, Regulatory Specialist, Growmark, Inc.

Discussion: Since the wellhead protection planning process is a voluntary effort, neither funding nor Department-instigated risk/benefit analysis has been initiated. Any wellhead protection effort should consider both the costs and the benefits incurred by the public water system.

Recommended Action: No changes are recommended.

11. Comment: **Why should businesses in a wellhead "setback zone" which were/already located therein be required to comply with the setbackzoning requirements, at their own expense?**

Commentators: David Wantland, Regulatory Specialist, Growmark, Inc.

Discussion: **They do not have to under this plan.** Since the wellhead protection planning process is a voluntary effort, any setback issues falling on pre-existing businesses are likely to be grandparented as existing uses. Further regulatory efforts are foreseen as somewhat unlikely, but in any event would necessarily have to be undertaken by the local controlling jurisdiction (water utility, town, etc.) per the discussion contained within the draft plan.

Recommended Action: No changes are recommended.

12. Comment: **Insufficient notification of the three public meetings was disseminated to interested water utilities.**

Commentators: L.D. McMullen, P.E., Ph.D., CEO/General Manager, Des Moines Water Works; John Bilstein, Atlantic Municipal Utilities, Atlantic; Leon Lamer, CEO/General Manager, Marshalltown Water Works; Jennifer Hemingway, Iowa Rural Water Association; Karen Nachtman, Water Services Coordinator, Iowa Association of Municipal Utilities; Harold Schiebout, City Manager, 335 First Avenue NW, Sioux Center, IA 51250.

Discussion: The Department intended to notify each eligible public water supply system in the state (about 800 systems) but the mass mailing was not completed in time, so it was suspended. The meeting schedule was FAXED and mailed to the Iowa Association of Municipal Utilities, Iowa Section American Water Works Association, and the Iowa Rural Water Association.

Recommended Action: No changes are recommended.

APPENDIX D

TABLES FROM CHAPTER 2

Table 1. Regulated activities under purview of the Iowa Department of Natural Resources which may impact wellhead protection.

ACTIVITY	AUTHORITY	PROGRAM DESCRIPTION
Abandoned Wells	567 Ch. 39, 47	These rules govern the proper plugging and abandonment of private water supply wells. The use of proper plugging procedures must be verified by a certified well contractor or an agent of the county board. More guidance can be obtained from ISU Extension pamphlets on well plugging and Technical Information Series 15 (Geological Survey Bureau) Guidelines for Plugging Abandoned Water Wells. Grants to counties are available to aid in the plugging of abandoned wells.
Air Quality	567 Ch. 20, 22	The department has jurisdiction over the atmosphere of the state to prevent, abate and control air pollution, by establishing standards for air quality and by regulating potential sources of air pollution through a system of general rules and specific permits. This includes stationary sources and anaerobic lagoons.
Animal Feeding Operations	567 Ch. 65	These rules govern all animal-feeding operations, permitting of such facilities, if required, and comprehensive regulation of livestock waste handling and disposal.
Floodplains	567 Ch. 70-75	Iowa regulates construction and excavation activities in or on floodplains. Only projects having dimensions or effects less than specified thresholds are exempted from the permit requirements. Permits maybe required for floodplain development; the construction, abandonment, modification or removal of dams; stream crossings and bridges; channel changes; and levees. The DNR also coordinates the Flood Insurance Program in Iowa. Some permitting authority is granted to local governments.
Groundwater Contamination	567 Ch. 133	These rules establish action levels for contaminants in groundwater and procedures for determining the parties responsible for groundwater contamination. The rules also address the response to contamination including investigation and required clean-up actions.
Hazardous Waste	567 Ch. 141, 143, 144, 145, 148, 150, 151	These rules offer guidelines and permitting procedures for hazardous waste generation, storage, handling, transportation, and disposal. Includes household hazardous wastes labeling requirements.
Nonpublic Water Wells	567 Ch. 38, 49	Construction of private water wells requires a permit from the department or the county board or its designated agent. This includes exploratory wells, monitoring wells, geothermal wells, injection wells, and water withdrawal wells. Chapter 49 sets forth standards for construction regarding methods, placement, and materials used in the construction.

Table 1. Continued.

Pesticide Application to Water	567 Ch. 66	This chapter defines the circumstances and provisions under which aquatic pesticides may be applied to surface waters.
Protected Water Source	567 Ch. 53	These rules provide for designating specific surface and groundwater resources as protected water sources. A protected water source designation may be made to preserve the availability of a water resource, prevent or minimize movement of groundwater contamination, maintain surface water quality, or preserve protected flows in a stream.
Public Water Supplies	567 Ch. 40, 41, 43	The department administers the public water supply program and establishes minimum standards for the construction, operation, and maintenance of public water supply systems. The public water supply program includes the establishment of drinking water standards, including maximum contaminant levels, treatment techniques, monitoring, and public notice requirements consistent with the federal Safe Drinking water Act.
Radioactive Waste Low-level Waste Disposal Facilities	567 Ch. 152	Establishes criteria for siting low-level radioactive waste disposal facilities.
Solid Waste	567 Ch. 100, 101, 102, 103, 104, 105, 106, 108, 110, 117, 118, 119	Rules covering the design, operation, and monitoring requirements for solid waste management facilities. These include sanitary landfills, recycling and composting facilities, waste tire and waste oil facilities, and disposal of PCBs.
Solid Waste: Land Application of Waste	567 Ch. 120, 121	Governs the disposal of solid wastes by land application including sub-surface injection.
Surface Water Quality Standards	567 Ch. 61	Establishes water quality standards for surface waters, classifies surface waters by designated uses and/or quality, and establishes an anti-degradation policy to maintain the existing physical, biological, and chemical integrity of all waters of the state. The standards establish the areas where these uses are to be protected and provide minimum criteria for waterways having non-designated uses as well. In addition, mixing zones are recognized for areas receiving effluent discharges.
Underground Storage Tanks	567 Ch 135	Regulations for underground tanks used for the storage of regulated substances, and rules relating to detection, prevention and correction of releases of regulated substances from such tanks.
Wastewater: Construction and Operation Permits	567 Ch. 64	Establishes design and operation standards that govern the development and operation of wastewater facilities.
Wastewater: Effluent and Pretreatment Standards, Monitoring	567 Ch. 62, 63	These rules have been developed to control the quality of any wastewater discharge to the surface waters of Iowa. They are consistent with federal standards; the National Pollution Discharge Elimination System (NPDES), issues permits which define the physical, chemical, and biological quality their effluent discharge must meet. Specific monitoring requirements are established.

Table 1. Continued.

Wastewater: Land Application of Sewage Sludge	567 Ch. 67	This chapter defines the standards that apply to the land application of sewage sludge, allowable pollutant concentration, management practices, application rates, and required monitoring
Wastewater: Commercial Septic Cleaners	567 Ch. 68	These rules govern the commercial cleaning of private systems, operator licensing, and the disposal of the waste.
Wastewater: On-Site Wastewater Treatment and Disposal Systems	567 Ch. 69	These rules govern the permitting, location, and operation of on-site wastewater disposal systems including private septic systems. Most counties have primacy for permitting, administering and monitoring such facilities.
Water Rights Allocation Water Withdrawal Permits	567 Ch. 50, 51, 52	These chapters define the state's process of water allocation: the diversion, storage, or withdrawal of surface water and groundwater. They furnish the guidelines for in-stream flow protection and restrictions on groundwater use. They also govern the registration of agricultural drainage wells. The state's water conservation plan is also detailed.
Well Owner Protection Well Interference	567 Ch. 54	These rules set guidelines and procedures to mitigate problems of well interference caused by large-scale pumping by permitted users and its impact on prior permitted users or nonregulated users.

Table 2. Wellhead protection related programs – other federal, state, and local agencies.

ACTIVITY	AUTHORITY	AGENCY	PROGRAM DESCRIPTION
Agricultural Products - Fertilizers, Ag-Lime, Pesticides	IAC Ch. 43, 44, 45 IC Ch. 200, 206	IDALS	These rules regulate the registration, labeling, and sale of fertilizers, soil conditioners, agricultural lime, and pesticides. Storage conditions and containment for both temporary and permanent chemical storage facilities are explained. The rules also define the procedures that are required for notification of pesticide use in urban areas and identify areas of the state where the use of restricted use pesticides are limited.
Animal Feedlots	IC Ch. 172D	IDALS	Covers zoning for feedlot location.
Coal Mining	IC Ch. 83	IDALS	This chapter defines the rules and regulations under which coal mining is permitted and the standards of conduct for mining operations. It also governs mine land reclamation including protection of water rights and replacement. The surface mine reclamation program involves enforcement of mining operation procedures that minimize soil erosion and water pollution.
Soil Conservation Districts-Flood and Erosion Control	IC Ch. 467 B, C	IDALS	Outlines the responsibilities of soil conservation boards with respect to projects for flood or soil erosion control, flood prevention, or the conservation, development, utilization, and disposal of water. It also empowers county boards of supervisors to establish rules and standards for replacing soil in strip-mined areas where it has been removed..
Soil Conservation Districts-Protection of Water Quality	IC Ch. 467 A	IDALS	Defines the establishment of soil and water conservation districts and the requirements of landowners under the law. Erosion control plans can be required for certain projects. Mechanisms for protecting the state's groundwater and surface water from point and nonpoint sources of contamination are explained.
CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) {Superfund}	40 CFR 401-407	U.S. EPA	The Superfund Program was established in 1980 to eliminate the health and environmental threats posed by hazardous waste sites. The U.S. Environmental Protection Agency (EPA) administers the Superfund program in Iowa through the Office of Solid Waste and Emergency Response (OSWER). Superfund locates, investigates and cleans up the worst hazardous waste sites throughout the United States.

Table 2. Continued.

FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act)	40 CFR 152, 162, 165, 170-171	U.S. EPA	IDALS is the designated state lead agency for enforcement and pesticide applicator certification programs, endangered species protection program, worker protection program, and groundwater protection program related to pesticides.
RCRA (Resource Conservation and Recovery Act)	40 CFR 260-282	U.S. EPA	The Iowa RCRA and State Programs Branch (IRSP) directly implements the hazardous waste program in the state of Iowa, specifically Subtitle C of the Resource Conservation and Recovery Act. Activities include permitting, compliance/enforcement, corrective action, and outreach to the public and the regulated community. Finally, the Branch manages the RCRA Information System (RCRIS) for Region VII. RCRIS is the principle means of reporting program accomplishments to EPA Headquarters, as well as being a management tool for Region VII and the states.
NCP (National Contingency Plan)	40 CFR Part 300	U.S. EPA	The NCP prescribes the process for addressing contaminated sites under CERCLA. It includes actions from preliminary investigations and assessment of risk through selecting and implementation of cleanup action. The NCP also addresses issues of responsibilities related to cleanup and oversight and sets requirements for community relations.
UIC (Underground Injection Control)	40 CFR 124, 144-148	U.S. EPA	The U.S. EPA administers the Underground Injection Control (UIC) Program as mandated by Part C of the Safe Drinking Water Act. The regulations associated with the UIC Program are contained in 40 CFR 124, 144-148. The practice of underground injection has become essential to many of today's industries including the petroleum industry, chemical industry, food and product manufacturing companies, geothermal energy development, and many local small specialty plants and retail establishments. Since groundwater is a major source of drinking water in the United States, the UIC program requirements were designed to prevent contamination of Underground Sources of Drinking Water (USDW) resulting from the operation of injection wells. In Region VII, EPA has delegated primary regulatory authority to Missouri, Kansas, and Nebraska, while the State of Iowa remains directly implemented by the EPA Regional office.

Table 2. Continued.

UIC (Underground Injection Control)	40 CFR 144-148	U.S. EPA	Nationally, 35 states have full primacy over each class of well; 6 states have partial primacy programs; and 16 states and territories have EPA direct-implementation programs. Types of injection wells that are regulated include: Class I - Hazardous and non-hazardous waste disposal wells, which inject below an USDW; 47 wells in the Region. Class II - Injection wells associated with oil and gas production; over 15,000 wells in the Region. Class III - Injection wells associated with mineral extraction; 543 wells in the Region. Class IV - Wells which inject hazardous wastes into or above an USDW (banned nationally). Class V - All other injection wells. Over 14,000 in the Region. Wells include: drainage wells, dry wells, cesspools, industrial septic system wells, and many other types of wells used for the injection of fluids into the ground. Facilities that discharge wastes to municipal sewers or directly to surface waters are not regulated by the UIC program. Single family residential cesspools or septic tanks, or non-residential cesspools or septic tanks which receive solely sanitary wastes and have the capacity to serve fewer than 20 persons a day are also not regulated by the UIC program.
Technical training	IC Ch. 137	IA Depart. of Public Health	Support County Boards of Health in identifying and correcting high risk to health conditions.
Well permitting, well abandonment	IC Ch. 455B	County Boards of Health	For counties with authority, a county sanitarian or public health nurse is usually the point of contact. Otherwise contact IDNR-EPD.
Transportation of Hazardous Materials	49 CFR – 107, 171-173, 177, 178, 180	Iowa Department of Transportation	Iowa adopts federal regulations (Iowa Administrative Code 761-520.1). IDOT's Motor Vehicle Enforcement Division enforces and permits under these regulations.

Table 3. Agency contacts and program responsibilities.

Agency Unit	Programs	Contact
IDNR Air Quality Bureau	Air quality programs	Pete Hamlin 7900 Hickman Rd Suite 1 Des Moines, IA 50322 515/281-8852 pete.hamlin@dnr.state.ia.us
IDNR Water Quality Bureau Water Supply Section	Water wells – public and private Abandoned wells Water withdrawal permits Drainage wells Individual water supply problems Source water and wellhead protection	Dennis Alt Wallace Bldg 502 E 9th St. Des Moines, IA 50319-0034 515/281-8998 dennis.alt@dnr.state.ia.us
IDNR Water Quality Bureau Wastewater	Wastewater construction and operation permits Individual wastewater treatment system problems	Wayne Farrand Wallace Bldg 502 E 9th St. Des Moines, IA 50319-0034 515/281-8877 wayne.farrand@dnr.state.ia.us
IDNR Water Quality Bureau Water Resources Section	Floodplain management Water quality certifications	Jack Riessen Wallace Bldg 502 E 9th St. Des Moines, IA 50319-0034 515/281-5029 jack.reissen@dnr.state.ia.us
IDNR Land Quality Bureau Solid Waste Section	Solid waste landfills Waste incinerators Land application of industrial sludge Solid waste transfer stations Municipal solid waste composting Solid waste recovery and recycling	Lavoy Haage Wallace Bldg 502 E 9th St. Des Moines, IA 50319-0034 515/281-4968 lavoy.haage@dnr.state.ia.us
IDNR Land Quality Bureau Contaminated Sites Section	Superfund Registry of hazardous waste or hazardous substance disposal sites Voluntary cleanup program Soil and groundwater contamination not covered by other programs	Susan Dixon Wallace Bldg 502 E 9th St. Des Moines, IA 50319-0034 515/242-6346 susan.dixon@dnr.state.ia.us
IDNR Land Quality Bureau Underground Storage Tanks	All regulations pertaining to underground storage tanks	Jim Humeston Wallace Bldg 502 E 9th St. Des Moines, IA 50319-0034 515/281-8957 jim.humeston@dnr.state.ia.us
IDNR Land Quality Bureau Emergency Response Unit	The Emergency Response Unit provides 24-hour technical assistance for response and remediation activities related to chemical spills and hazardous conditions.	Kathleen Lee 515/281-8793 Wallace Bldg 502 E 9th St. Des Moines, IA 50319-0034 kathleen.lee@dnr.state.ia.us
IDNR Geological Survey Bureau Hydrogeology and Environmental Studies Section	Geologic information Well logs Public, private, drainage well locations	Bob Libra 319-335-1575 109 Trowbridge Hall Iowa City, Iowa 52242-1319 blibra@igsb.uiowa.edu

Table 3. Continued.

IDNR Waste Management Division	Waste reduction assistance	Cherrine Bates Wallace Bldg 502 E 9th St. Des Moines, IA 50319-0034 515-281-8499
IDALS Laboratory Division Pesticide Bureau	Pesticides	Chuck Eckermann Wallace Bldg 502 E 9th St. Des Moines, IA 50319 515-281-8591 Chuck.Eckermann@idals.state.ia.us
IDALS Soil Conservation Division Water Resource Bureau	Non-point source pollution	Dean Lemke Wallace Bldg 502 E 9th St. Des Moines, IA 50319 515-281-6143 dlemke@osmre.gov
IDALS Soil Conservation Division Mines and Minerals Bureau	Coal mining	Kenneth Tow Wallace Bldg 502 E 9th St. Des Moines, IA 50319 515-281-6147 ktow@sela.osmre.gov
IDALS Laboratory Division Fertilizer Bureau	Fertilizer	John Whipple Wallace Bldg 502 E 9th St. Des Moines, IA 50319 515-281-8599 John.Whipple@idals.state.ia.us
IDPH Division of Health Protection Bureau of Environmental Health Toxic Substances Evaluation - Hazardous Substances Emergency Releases	Hazardous substances emergency releases (and related exposures) are investigated and an ongoing surveillance system is maintained. A newsletter, HazMat Quarterly, is published and distributed to hazmat teams, hospital emergency rooms, fire departments, EMS providers, police departments, and local emergency planning committees to provide assistance in planning for (and responding to) chemical release emergencies.	Lucas State Office Building 321 E. 12th Street Des Moines, Iowa 50309 (515) 242-6337
IDOT Hazardous Materials Hauling	Hazardous waste transport rules	MVE - Hazardous Waste Unit Park Fair Mall 100 Euclid Avenue P.O. Box 10473 Des Moines, Iowa 50010 515-237-3219
IDOT Signs	Authorizes and develops road signs	Local area maintenance manager
U.S. EPA RCRA	Permitting/enforcement Compliance assistance Grants Corrective actions Inspections	Larry Hacker 726 Minnesota Avenue Kansas City, Kansas 66101 913-551-7602

Table 3. Continued.

U.S. EPA Toxics	TSCA EPCRA Pollution prevention	Jim Callier 726 Minnesota Avenue Kansas City, Kansas 66101 913-551-7646
U.S. EPA CERCLA	Response actions	Glen Curtis 726 Minnesota Avenue Kansas City, Kansas 66101 913-551-7726
U.S. EPA Drinking Water/Groundwater Management	UIC Wellhead protection	Robert Morby 726 Minnesota Avenue Kansas City, Kansas 66101 913-551-7682

Table 4. Public and non-governmental organizations with programs related to wellhead protection.

ORGANIZATION	PROGRAM DESCRIPTION
Groundwater Foundation P.O. Box 22558 Lincoln, NE 68542-2558 1-800-858-4844 E-mail: info@groundwater.org	The Groundwater Foundation is dedicated to informing the public about groundwater. A variety of programs and publications demonstrate the benefits everyone receives from groundwater and the very real risks to groundwater. The Groundwater Guardian program encourages communities to begin groundwater awareness and protection activities, supports the community in their efforts and recognizes their achievements.
Iowa Section--American Water Works Assoc. Dave Scott 1000 Walnut Street Suite 102 Des Moines, Iowa 50309-3433 Voice: 515-283-2169 Fax: 515-284-7301	The Iowa Section of the American Water Works Association is comprised of over 700 members engaged in providing and protecting the state's drinking water resources. Our membership includes scientists, engineers, environmentalists, public health experts, educators, and water managers. Our primary objectives are the advancement of technical and scientific knowledge, public education, and preservation of the state's water resources.
Iowa State Association of Counties William R. Peterson Executive Director 701 E. Court Avenue, Suite A Des Moines, IA 50309-4901 Voice: (515) 244-7181 Fax: (515) 244-6397 E-mail ISAC25@aol.com:	The Iowa State Association of Counties is a professional organization that acts as a forum to advise, assist, and represent county governments in Iowa and the people they serve. The mission is to improve and promote efficient and fiscally sound county government for the people of Iowa through publications, education, advocacy, and other services.
Iowa Association of Municipal Utilities Karen Nachtman 6900 NE 14th Street, Suite 27 Ankeny, IA 50021-8997 Voice: (515) 289-1999 Fax: (515) 289-2499	The Iowa Association of Municipal Utilities (IAMU) is a not-for-profit membership organization providing services to 546 city-owned water, electric, gas, and communication utilities. IAMU provides members with services such as: communications, education, legislative affairs, representation on regulatory issues, support of regulatory compliance, water and wastewater operator training, safety training, and coordination of mutual aid among members in emergency situations.
Iowa Association of Business and Industry Elliott G. Smith Vice President, Government Relations 904 Walnut Street, Suite 100 Des Moines, IA 50309-3503 Voice: Iowa toll free (800) 383-4224 Voice: (515) 280-8000 Fax: (515) 244-8907 E-mail: esmith@iowaabi.org www.iowaabi.org	The Iowa Association of Business and Industry is a statewide organization dedicated to serving as the leading legislative and regulatory advocacy group for the Iowa business community, representing approximately 2000 Iowa businesses that employ over 300,000 employees.

Table 4. Continued.

Iowa Environmental Council Susan Heathcote Research Director 7031 Douglas Avenue Des Moines, IA 50322 Voice: (515) 237-5573 Fax: (515) 237-5385 Email: heathcote@earthweshare.org www.earthweshare.org	The Iowa Environmental Council (IEC) is a non-profit alliance of 55 member organizations and over 200 individual members. The IEC's mission is to seek a sustainable future through shaping public policy, research and education, coalition building, and advocacy. The IEC served on the DNR's wellhead protection advisory panel and supports implementation of Iowa's Wellhead Protection Plan. The IEC addresses the need for technical assistance to communities for implementation of this plan in the Education and Outreach section of the Water Quality Action Plan, published in January 1998. For more information visit the IEC website [address at left] or contact: Linda Appelgate, Executive Director, Iowa Environmental Council, 7031 Douglas Avenue, Des Moines, Iowa 50322, (515)237-5321, appelgate@earthweshare.org.
Iowa Farm Bureau Federation Rick Robinson IFBF Director, Local & Environmental Affairs 5400 University Avenue West Des Moines, IA 50266 Voice: (515) 225-5400 Direct voice: (515) 225-5432 Fax: (515) 225-5419 E-mail: rrobinson@ifbf.org	The Iowa Farm Bureau Federation will be working on developing an Iowa Farm*A*Syst program. Through a series of self-assessment worksheets and a computer program, this program may be used to identify environmental risks from a wide range of farm and home structures. Fact sheets and technical referrals may be used to develop site-specific, voluntary action plans to prevent pollution, including farm wellhead protection.
Iowa Groundwater Association (IGWA) Nancy Hall Editor, *Iowa Groundwater Quarterly* Hygienic Laboratory 102 Oakdale Campus Iowa City, IA 52242-5002 (319) 335-4500 You may also contact the IGWA at: Voice and Fax: (319) 338-IGWA E-mail: igwa@aol.com	The Iowa Groundwater Association (IGWA) is as an independent statewide association organized for advancing the understanding of Iowa's groundwater resources. IGWA objectives include: promoting education and research on Iowa groundwater issues; fostering cooperation and information exchange throughout its membership; improving communication among state regulatory officials, professionals, and technicians working with groundwater; cooperating with the activities of various state and national associations organized in the interest of groundwater use, conservation, management, and protection. The IGWA publishes a quarterly newsletter, the *Iowa Groundwater Quarterly*.
Iowa League of Cities 317 6th Avenue, Suite 1400 Des Moines, IA 50309-4122 Voice: (515) 244-7282 E-mail: iowaleague@compuserve.com www.iowaleague.org	The Iowa League of Cities is dedicated to strengthening local government and encouraging dynamic local leadership in Iowa's municipalities. The League is committed to defending the constitutional provision of Home Rule by supporting cities with administrative leadership, technical assistance, legislative representation, communication and training, and sponsorship of affiliated programs that provide municipal services.
Iowa Rural Water Association 100 Court Avenue, Suite 409 Des Moines, IA 50309-4122 Voice: (515) 283-8214 E-mail: mdickey@iarwa.org www.iarwa.org	The Iowa Rural Water Association's mission is to serve its members by providing service and leadership in legal and legislative affairs, public and member relations, education, financial and economic growth, and prominence in the water supply industry. On-site services are provided to both water and wastewater systems and include assistance in development of wellhead protection plans.

Table 4. Continued.

Iowa State University Extension Tom Glanville 201 Davidson Hall Iowa State University Ames, IA 50011-3080 Voice: (515) 294-0463 Fax: (515) 294-9973 E-mail: tglanvil@iastate.edu www.ae.iastate.edu	Through its network of 100 county offices, Extension offers small group meeting facilities, high-speed connections to Internet-based information, and excellent contacts with community leaders and local interest groups. One-hundred County Extension Education Directors and nearly 50 field- and campus-based community development specialists and engineers are available to help plan and deliver public information on the benefits of wellhead protection programs.
Iowa Waste Reduction Center University of Northern Iowa (319)273-2079 www.iwrc.org	The Iowa Waste Reduction Center serves small businesses in Iowa by providing free, non-regulatory, and confidential on-site environmental assistance.
Iowa Water Well Association (IWWA) Cathy Heldt Executive Director 431 East Locust Street, Suite 202 Des Moines, IA 50309 Voice: (515) 243-1558 Fax: (515) 243-2049	The purpose of the Iowa Water Well Association (IWWA) is to assist, promote, encourage, and support the interests and welfare of the water well industries in the State of Iowa.
Izaak Walton League, Iowa Division 1540 High Street Des Moines, IA 50309	A diverse group dedicated to protecting our nation's soil, air, woods, waters and wildlife. Promotes awareness of water quality issues through the Save Our Streams program.
Soil and Water Conservation Districts	Iowa has about 100 soil and water conservation districts (SWCDs) charged with the administration of soil erosion abatement programs. IDALS DSC gives them technical and administrative assistance.
Natural Resources Conservation Service	Provides technical assistance on soil, water, and related resources through soil and water conservation districts. Examples related to WHP include soil survey information and interpretation, the soil –pesticide interaction screening procedure, nutrient management planning including manure management plans, and assistance on locally developed projects to protect water resources. Provides assistance to producers to develop conservation plans to address soil, water, and other resource needs. Provides technical information for the Conservation Reserve Program administered by the Farm Service Agency. Eligible cropland in EPA-approved WHP areas may be included in the program.
Midwest Assistance Program (MAP) H.B. Calvert Box 261 Fort Madison, IA 52627 (319) 372-1898	Midwest Assistance Program, Inc. (MAP) is a private, non-profit organization providing technical assistance and training to small, rural communities with water and wastewater needs. MAP assists communities in many aspects of developing a wellhead protection plan, such as: community organization; educating community leaders; identifying delineation area; on-site assessment of contaminants; planning and budgeting to pay for costs associated with wellhead protection; hiring a consultant, if necessary; identifying options or developing ordinances to protect the wellhead area; and identifying and accessing outside funding for wellhead protection.

Table 4. Continued.

U.S. Army Corps of Engineers U.S. Army Engineer District, Rock Island Clock Tower Building Box 2004 Rock Island, IL 61204-2004 Voice: (309) 794-5900 Fax: (309) 794-5793 www.ncr.usace.army.mil Omaha District Corps of Engineers 215 North 17th Street Omaha, Nebraska 68102-4978 Voice: (402) 221-3900 www.cemro.mro.usace.army.mil U.S. Army Corps of Engineers Information Management Division 190 East Fifth Street St. Paul, MN 55101 Voice: (612) 290-5111 www.mvp.usace.army.mil	Contaminated Water Assistance - The Corps of Engineers is authorized to provide clean water to communities with contaminated water supplies that represent a substantial threat to the public health and welfare. Contamination may have resulted from deliberate, accidental or natural events, including flooding. Type of Assistance Provided by the Corps: Provide water tank trucks to haul water from a safe source to the point established for local distribution. Procurement and distribution of bottled water. Temporary connection of a new supply to the existing distribution system. Installation of temporary filtration system. Provide mobile military purification units. Criteria for Corps of Engineers Assistance: A written request for assistance is required from the governor of the state and/or authorized representative. State and local governments must fully utilize their own resources, including National Guard Capabilities. Duration of Assistance The Corps assistance normally will be temporary to meet the immediate threat. Assistance is limited to 30 days, or until the Federal Emergency Management Agency undertakes the provision of emergency water under its own authorities, whichever is earlier. How to Obtain Help Contact your local political representatives so they may inform the state governor's office. The governor must ask the Corps to provide assistance.

APPENDIX E

DATABASES AND CONTACTS

Natural Resources Geographic Information System
IDNR began development of the Natural Resources GIS for the State of Iowa in 1987. The NRGIS library currently contains approximately 950 GIS databases ("coverages"). Many were created from information collected for the permitting/registry programs described below.

Contact: IDNR - Geological Survey Bureau
Jim Giglierano 319-335-1575, email: jgiglie@igsb.uiowa.edu

Geologic Sample Inventory (GEOSAM/GeoUTM)
This database and GIS coverage were developed to manage geologic sample data including wells, outcrops, drill cores, and other material. The GIS coverage is derived from the database.

Contact: IDNR - Geological Survey Bureau
Bill J. Bunker 319-335-1575, email: bbunker@igsb.uiowa.edu

Municipal Water Supply Inventory (MWSI)
This database includes information about Iowa's municipal and rural water supply system wells and surface water intakes. A GIS coverage is under development.

Contact: IDNR - Geological Survey Bureau
Paul VanDorpe 515-335-1575, email: pvandorpe@igsb.uiowa.edu

Water Allocation and Use
A permit is required for wells and surface water intakes that withdraw more than 25,000 gallons of water per day. A database consisting of facility and site data is available and a GIS coverage of facilities is available. A database and GIS coverage of wells permitted under this program is under development.

Contact: IDNR – Water Supply Bureau
Dennis Alt 515-725-0275, email: dennis.alt@dnr.state.ia.us

Public Water Supply Well Construction
Wells which server more than 15 connections or more than 25 individuals must be permitted as public water supplies. A database and partial GIS coverage are available. A database and GIS coverage of non-municipal public water supply wells is under development.

Contact: IDNR – Water Supply Section
Dennis Alt 515-725-0275, e-mail: dennis.alt@dnr.state.ia.us
Mike Anderson 515-725-0336, email: michael. anderson@dnr.state.ia.us

Private Water Well Construction
A permit is required of all landowners or their agents before constructing a private well. Databases and GIS coverages have been developed from the permit records by GSB and EPD and are being updated as new information is received. Some of these wells are included in the well databases previously discussed.

Contact: IDNR – Water Supply Section
Brent Parker 515-725-0337, e-mail: brent.parker@dnr.state.ia.us

Abandoned Well Program
Unused private wells may be sealed with cost-share moneys from grants to counties. These wells are included in a database and a GIS coverage developed from the wells registered in this program.

Contact: IDNR – Water Supply Section
Brent Parker 515-725-0337, e-mail: brent.parker@dnr.state.ia.us

Well Testing Program
Private water wells may be tested for bacteria and nitrate levels. A database and GIS coverage are available.

Contact: IDNR – Water Supply Section
Brent Parker 515-725-0337, e-mail: brent.parker@dnr.state.ia.us

Solid Waste Disposal
All aspects of solid waste disposal are regulated by the state with the exception noted below. All solid waste disposal facilities are required to be permitted including landfills, incinerators, recyclers, sludge disposal by land application, disposal of construction and demolition wastes. A GIS coverage which includes sanitary landfills, transfer stations, land application sites, and incinerators is available.

Contact: IDNR – Solid Waste Section
Lavoy Haage 515-281-7814, e-mail: lavoy.haage@dnr.state.ia.us

RCRA Information System (RCRIS)
EPA's tracking system for RCRA sites, i.e., facilities which generate hazardous waste or are involved with transportation, storage, and disposal of hazardous wastes.

Contact: EPA Region VII
Iowa RCRA Branch 913-551-7050

CERCLA Information System (CERCLIS)
EPA's tracking system for Superfund National Priorities List (NPL) sites and potential NPL sites.

Contact: EPA Region VII
Superfund Division 913-551-7050 www.epa.gov/superfund/oerr/impm/products/cursites/csitetoc.htm

Uncontrolled Site and Emergency Response (USER) and Site Investigation Report Review (SIRR)
Active uncontrolled sites, including Superfund sites, and emergency response sites are included in the USER database. USER includes information about the site, contamination found, and involved parties. Initial information on sites at which contamination has been found is in the SIRR database.

Contact: IDNR – Solid Waste Section
Lavoy Haage 515-281-7814, e-mail: lavoy.haage@dnr.state.ia.us

Wastewater Construction
Wastewater Operation Permits are required for construction and operation of any industrial, municipal, or animal feeding wastewater treatment facility or discharge of any pollutant to a water body in the state. Databases and a GIS coverage have been created.

Contact: IDNR – Wastewater Section
Wayne Farrand 515-281-8877, e-mail: wayne.farrand@dnr.state.ia.us.

Underground Storage Tank Registration
All registered underground storage tanks (except tanks used to store heating oil which will be used on the premises, septic tanks, flow-through process tanks, etc.) must be registered with DNR. Databases and a GIS coverage have been created for underground storage tanks and leaking underground storage tanks.

Contact: IDNR – Underground Storage Tank Section
Jim Humeston 515-281-8135, e-mail: jim.humeston@dnr.state.ia.us

Agricultural Drainage Wells
All agricultural drainage wells (ADWs) must be registered with IDNR. A database and GIS coverage have been created. IDALS is conducting a program to identify management practices to control groundwater contamination through ADWs.

Contact: IDNR – Water Resources Section
Jack Riessen 515-281-5029 e-mail: jack.riessen@dnr.state.ia.us

Pesticide/Fertilizer registration/certification
Programs managed by the Iowa Department of Agriculture and Land Stewardship to monitor pesticide and fertilizer use include pesticide dealer/applicator licensing. Sites where pesticides are sold or prepared for use are registered with the department. A GIS coverage is under development.

Contact: IDALS – Laboratory Division
James Ellerhoff – Pesticides: 515-281-8506, e-mail:
Jim.Ellerhoff@idals.state.ia.us

John Whipple – Fertilizer: 515-281-8599, e-mail:
John.Whipple@idals.state.ia.us

APPENDIX F

WELLHEAD ORDINANCES

This appendix provides excerpts from ordinances that have been enacted in other cities. In most cases these have been selected to represent particular management options. Additional help on constructing an ordinance for your town can be obtained from the League of Iowa Cities.

The following ordinance is a comprehensive model ordinance developed for use by Texas municipalities. It relies heavily on well construction standards.

TEXAS WELLHEAD PROTECTION MODEL ORDINANCE

Purpose of Document

This Wellhead Protection model ordinance is being provided as a public service of the Texas Natural Resource Conservation Commission's Public Drinking Water Section. The purpose is to provide cities participating in the State's Wellhead Protection Program with legislation aimed at protecting their underground public water supply systems. The ordinance is a broad piece of legislation that any city should be able to adopt with a minimum of effort. However, the city council should review the document carefully to ensure the applicability of each article and section. Special attention should be paid to the statutorial authorization as this may differ from city to city.

It should be noted that cities are not required to adopt this model ordinance nor regulate the activities contained herein. However, for those cities who have expressed a desire to control potential sources of contamination within their wellhead protection areas and have no guide for drafting legislation this document may be helpful in establishing desired ordinances. Cities are free to make whatever changes they require to fit their needs.

Disclaimer of Liability

The Texas Natural Resource Conservation Commission, it agents, officers, and employees shall be exempt from liability, either directly or indirectly, arising out of claims against this ordinance.

Ordinance No. _____

WELLHEAD PROTECTION ORDINANCE

ARTICLE 1: STATUTORY AUTHORIZATION, FINDINGS OF FACT, PURPOSE AND METHODS

SECTION 1.01. Statutory Authorization

WHEREAS, Article 1175, Subdivision 19 of the Texas Revised Civil Statutes states in pertinent part that a city has the power to prohibit the pollution of any stream, drain, or tributaries thereof, which may constitute the source of water supply of any city and to provide policing of same as well as to provide for the protection of any watersheds; and

WHEREAS, the City Council has expressed its desires for the City to regulate the drilling of water wells within the City's jurisdiction; and

WHEREAS, the City Council has reviewed and examined the proposed wellhead protection/water well drilling regulations as set out herein to promote the health, safety, and general welfare of the community and the safe, orderly, and healthful development of the city of _____, Texas; now, therefore,

THE CITY COUNCIL OF THE CITY OF _____, TEXAS DOES HEREBY ORDAIN THE FOLLOWING:

SECTION 1.02. Findings of Fact

(1) It has been determined that potential sources of contamination exist which may threaten the integrity of the city of _____'s public water supply, and consequently, the health, safety, commerce, public services, property, and the general welfare of the public.

(2) These potential sources of contamination are created by a cumulative effect of anthropo genic and/or natural activities taking place within sufficient proximity to the City's public water supply or source of said supply as to pose a threat of contamination.

SECTION 1.03. Statement of Purpose

It is the purpose of this ordinance to promote the public health, safety and general welfare and to minimize public and private losses due to contamination of the public water supply, to maximize groundwater protection/pollution abatement control procedures, and minimize land use restrictions that:

(1) Protect human life and health;

(2) Minimize expenditure of public money for costly pollution remediation projects;

(3) Minimize regulations on land use;

(4) Minimize business interruptions;

(5) Minimize damage to public facilities and utilities such as water mains, sewer lines, and treatment facilities;

(6) Insure that the public is provided with a safe potable water supply now and for future generations;

(7) Protect the natural resources of the state.

SECTION 1.04. Methods of Reducing Potential Contamination

In order to accomplish its purposes, this ordinance shall employ the following methods:

(1) Establish a wellhead protection area (WHPA) based on a five year time of travel.

(2) Restrict or prohibit uses within the WHPA that pose risks of contamination to the public water supply.

(3) Control anthropogenic activities within the WHPA that may increase the threat of potential contamination of the public water supply.

(4) Frequent monitoring of existing and future anthropogenic activities within the WHPA that have been identified as potential sources of contamination.

(5) Enforcement of all applicable laws governing pollution abatement and control, storage and transport of hazardous or toxic materials, and collection, storage, and transport and treatment of municipal and industrial sewage.

(6) Develop contingency plans for alternative drinking water supplies to help mitigate contamination of the current public water supply.

(7) Inventory all potential sources of contamination within designated WHPA(s) every _____(2 to 5) years.

(8) Enforcement of State and local laws regulating on-site sewage systems.

(9) Prohibition of storage of hazardous or toxic materials within the WHPA that is upgrade of the PWS well.

(10) Enclosure of the PWS well within a roofed structure located inside a fenced enclosure accessible only via a locked gate. The well number shall be posted on the fence and a raised impermeable barrier or berm shall be constructed around the wellhead to prevent infiltration of the well bore by surface runoff.

(11) Posting of signs that state "Wellhead Protection Area, _____ (name of com munity)" around the perimeter of the WHPA(s) with references to this and other applicable ordinances plus emergency telephone numbers.

(12) Regulation of the construction, operation, correction and abandonment of water wells within both the City limits and the extraterritorial jurisdiction (ETJ).

(13) Develop and implement an Emergency Response Plan to respond to potential contamination events.

(14) Public education.

ARTICLE 2: NEW WELLS

SECTION 2.01. Powers and Duties of City Council

The City Council of _____ or its designated agent or representative shall have the following powers:

(1) To make or have made examinations of all wells within the City and all wells outside the City limits which by law is under the jurisdiction of the City, privately owned or otherwise;

(2) To make or have made at any time the necessary analyses for tests of water therefrom;

(3) To go upon the land and property of the owner of a well for that purpose;

(4) To require the owner to furnish all information requested concerning a well, including, in the case of new wells, complete logs of the well showing depth to the aquifer through all geologic formations encountered;

(5) To supervise the construction, repair, abandonment and plugging of wells with and the operation of such wells. The Council shall keep a register of all wells within the incorporated area of the city and its ETJ, which shall show the name of the owner, the location and the date of construction of each well, its depth and diameter, the purpose for which the well was constructed, and if abandoned, the date of abandonment.

All acts authorized to be done by the City Council may be performed by such persons as may be authorized by such Council to act for it.

SECTION 2.02. Compliance with Article

It shall be deemed a violation of this article for any person to fail or refuse to comply with any order of the City Council made in conformity with and under the authority of this article.

SECTION 2.03. Scope of Article

The provisions of this article shall apply to all wells or other openings greater than ten (10) feet in

depth. Furthermore, the owner of any proposed well shall be required to apply and receive from the City Council a permit to construct such a well or opening, the application for which shall supply all the information required under this ordinance, and for such permit the Council shall charge and receive the fee hereinafter provided for.

SECTION 2.04. Permit - Required for Work on Wells

It shall be unlawful for any person to drill or otherwise construct, repair, correct, abandon or plug a well, or to engage upon such work, within the limits of the area defined in this ordinance, or to employ anyone else to engage in such work, without first applying for and securing a permit from the City Council or a duly authorized agent thereof. Such permit may be granted with the approval of the City Council to any person who files with such Council the application hereinafter provided for and pays the fee hereinafter required, and complies with all other provisions of this article applicable to him.

SECTION 2.05. Same — Application

Every application for a permit for the drilling, construction, repair and correction, abandonment of plugging of a well, shall state the name and address of the owner thereof, the purpose for which the permit is desired, which shall be done or more of the acts above-mentioned; the definite location of the well or proposed well; its approximate depth; and if for a permit for the drilling or construction or repair and correction of a water well, the estimated amount of water to be, or which is pumped daily, monthly or annually, and the use or uses for which the water will be or is required; if for a permit for the drilling or construction or for the repair and correction of a well, the proposed method of drilling or construction, or the proposed method of repair and correction, and the kind of equipment to be used, and in all cases, the name of the contractor(s), and the license number issued by the Texas Water Well Drillers Board, if done through a contractor, whom the owner desires to drill or construct, repair and correct, or do the work pursuant to an abandonment of a well in compliance with this Article.

SECTION 2.06. Same — Inspection Before Issuance

It shall be the duty of the City Council or its designated agent or representative to inspect the property where any well is to be drilled, sunk, dug, or bored and to refuse the issuance of a permit to drill, sink, dig or bore a well in a place which does not meet with its approval as to drainage and other sanitary conditions.

SECTION 2.07. Same — Execution

All permits shall be executed in triplicate, one copy to be delivered to the applicant and two copies to be retained in the office of the City Council.

SECTION 2.08. Same — Additional Permits

It shall be unlawful for any applicant who obtains a permit to construct a well of a certain depth, to extend such well to a depth exceeding the depth provided for in such permit without first obtaining and additional permit therefor.

SECTION 2.09. Same — Fees — Amounts

The fees to be paid to the City Council for the permits required by this article shall be as follows:

(1) Permit for the drilling or construction of a new well up to fifty feet deep, ten dollars.

(2) Permit for the drilling or construction of a new well fifty feet deep to one hundred-fifty feet deep, twenty dollars.

(3) Permit for the drilling or construction of a new well one hundred-fifty feet deep to four hundred feet deep, thirty dollars.

(4) For the drilling or construction of a new well over four hundred feet deep, the fee last named and in addition thereto, for each one hundred feet or fraction therefor in excess of four hundred feet, ten dollars.

(5) Permit to repair or correct a defective well, twenty dollars.

(6) Permit to abandon or plug a well, five dollars.

SECTION 2.10. Same — Same — Disposition

All fees and other money collected by the City Council by virtue of this article shall be expended by such Council to cover the expense of making examinations of wells within the City, to make or have made the necessary analyses and test of water therefrom, to supervise the construction,

repair, abandonment and plugging of wells and their operation, and such other expenses as may be necessary to enforcement of this article.

SECTION 2.11. Casing of Wells Required

Every well constructed, whether drilled, dug, or excavated, which encounters salt water or water containing mineral or other substance injurious to health or vegetation, shall be securely plugged and sealed or cased in such manner that the waters be confined to the stratum or strata in which found, and all wells shall be so constructed and cased in such manner that the waters be confined to the stratum or strata in which found, and all wells shall be so constructed and cased so that no water from one stratum can by reason of the construction of the well come in contact with waters from another stratum. The casing shall be set in the top of the stratum from which water is to be taken and shall be cemented in place by suitable method to be approved by the City Council to the end that cement be forced up around the outside of the casing from the bottom of the casing to the surface of the ground so that all water found in the strata, except that from which water is to be used, shall be sealed off one from the other by the cement, or, if a better method than cementing shall be scientifically developed to accomplish the purpose mentioned, such better method may be prescribed by the Council in lieu of cementing. The casing used may consist of the following materials:

(1) Plastic Casing - shall be National Sanitation Foundation (NSF) or American Society of Testing Material (ASTM F-480) approved. Examples include the following:

   a. Flouropolymer materials; includes:
      1. Polytetrafluoroethylene (PTFE)
      2. Tetrafluoroethylene (TFE)
      3. Fluorinated ethylene propylene (FEP)
      4. Perfluoroalkoxy (PFA)

   b. Thermoplastic materials; includes:
      1. Polyvinyl chloride (PVC)
      2. Acrylonitrile butadiene styrene (ABS)

(2) Steel casing - shall be at least standard weight (schedule 40) through 8-in. inside diameter. Larger diameter casing shall have minimum weight and thickness given by B-36, 10-1959 of the American Standards Association (ASA) and standards A53-65 or A120-65

of the American Society of Testing Material (ASTM). Examples include the following:

c. Metallic materials; includes:
   1. Carbon steel
   2. Low-carbon steel
   3. Galvanized steel
   4. Stainless steel (304 and 316)

The casing and screen proposed to be used in each well shall conform to the figures stated below and shall be approved by the City Council or its authorized representative.

Casing Pipe Weights and Dimensions

Size in Inches	Wgt. Lbs. Per Ft. Plain End	Wgt. Lbs. Per Ft. Thrds. & Cplgs.*	Thickness in Inches
1	1.68	1.68	.133
1 ¼	2.27	2.28	.140
1 ½	2.72	2.73	.145
2	3.65	3.68	.154
2 ½	5.79	5.82	.203
3	7.58	7.62	.216
3 ½	9.11	9.20	.226
4	10.79	10.89	.237
5	14.62	14.81	.258
6	18.97	19.18	.280
8	28.55	29.35	.322
10	34.24	35.75	.307
10	40.48	41.85	.365
12	43.77	45.45	.330
12	49.56	51.15	.375
14	54.57	57.00	.375
16	62.58	65.30	.375
18	70.59	73.00	.375
20	78.60	81.00	.375

*Nominal weight based on length of 20 feet including coupling.

The casing shall be mechanically continuous from the point of setting the bottom of the well to a point not less than twelve inches above ground level and shall be so installed as to make impossible any leakage as against any pressures which may be encountered. If casing is of two or more diameter sizes, the different sizes shall be connected with threaded nipples or be sealed with rubber, cement or by some other manner satisfactory to the City Council.

SECTION 2.12. Wells Contaminating Other Water Sources

Any well or other opening located inside the area defined in this ordinance which penetrates the underground water supply and which pollutes or contaminates any other wells or the City's water supply, is declared a nuisance, and on notice to the owner of such well, or to the operator therefor, or to his agent in charge of the well or of the property on which it is situated, issued by the City Council such nuisance shall be abated by the owner within ten days from the date of such notice by filling and plugging the well or opening in the manner provided for in this article for abandoned wells; and if he shall fail to abate such nuisance within such time, or if owner or his agent, such Council shall have the right to go on the land or property upon which the well is situated and abate such nuisance in the manner provided and the owner thereof shall be liable to the City Council for the cost of such work and shall pay such cost upon demand.

SECTION 2.13. Defective Wells

Every well whether dug or drilled, which for any reason does not completely prevent the mixing of water or other liquid from above and below the source of the City's water supply, or which for any reason would tend to pollute or contaminate any other well or the water in the source of the City's water supply, shall be considered a defective well and the City Council on its own initiative or upon information or complaint from any source may make such an examination of any well suspected of being defective and if such an examination indicates in the opinion of the Council that the well is a probable source of contamination of the City water supply or any other well, or that the water from such well is unsafe for human consumption, shall issue written instructions to the owner or his agent in charge of such well or the property with the provisions of this article, and prescribe a time which in its judgment, under all the circumstances, is reasonable within which such instructions shall be complied with. It shall be unlawful for the owner or operator of such defective well to fail to comply with such instructions within the time prescribed by the City Council.

SECTION 2.14. Abandoned Wells

An abandoned well is: (a) a defective well which, in the judgment of the City Council, cannot be corrected to comply with the requirements of this article, or (b) any well which has been continuously out of use for a period of six (6) months, or longer. Whenever any wells have not been in active use for more than two years, the owner or operator of such well shall report the fact to the Council. Every abandoned well shall be filled and plugged with such materials and in a manner approved by the Texas Water Well Drillers Board that will, in their and the City Council's judgment, prevent the pollution and contamination of the City's water supply or the contamination of any other well within the limits of the City, and such filling and plugging shall be done under the supervision of the Council and at the expense of the owner of such well.

Whenever the City Council shall receive notice from any source of the existence of an abandoned well which has not been plugged and filled in accordance with the provisions of this article and/or the Texas Water Well Drillers Board, it shall notify the owner or agent in charge of such well or of the property upon which it is situated that such well is abandoned and shall instruct him to fill and plug such well in accordance with this article; and the owner or operator of such well shall comply with such order within sixty days after its date. Should he fail to so comply within such period or if, after using reasonable diligence, should the Council fail to locate the owner or the agent in charge of such well or of the property upon which the well is situated, the Council may go on the land or property upon which the well is situated and fill and plug such well in the manner required by this article. Whenever it becomes necessary for the Council to fill and plug any abandoned well the owner thereof shall be liable to the City Council for the cost of doing such work and shall pay such cost upon demand.

SECTION 2.15. Wells Outside City; Abating Nuisance; Drilling

The owner or lessee of property on which any well heretofore drilled or that may be hereafter drilled outside the City which is found to be contaminating or polluting influence to the underground water-bearing strata from which the municipal water supply of the City is taken or drawn or may hereafter be taken or drawn, as well as the owner or lessee of all wells drilled inside the area defined in this ordinance shall be subject to all the provisions of this article relating to the protection of the water supply of the City, and any such contaminating well may be abated as provided therein. Any person desiring to drill a well outside of the City at any location within the radius of two miles outside the City, prior to drilling such well shall fully comply with all provisions of this article relating to the protection of the water supply of the City, and upon failure to do so shall be punished as provided herein.

SECTION 2.16. Wells Imposing Immediate Threat; Abating Nuisance

Any well or other opening located inside the area defined in this ordinance which, in the sole opinion of the City Council or its agents, presents an immediate threat and menace to the health, morals, safety or general welfare of the public is declared to be a nuisance. The City Council or its agents shall have the right to go on property upon which such wells is situated and abate the nuisance in a temporary manner. Such well shall thereafter be filled and plugged by the owner after the giving of required notice and in such manner set out in Section 2.14 hereof. The owner thereof shall be liable to the City Council for the cost of doing such temporary work under this Section and shall pay such cost upon demand.